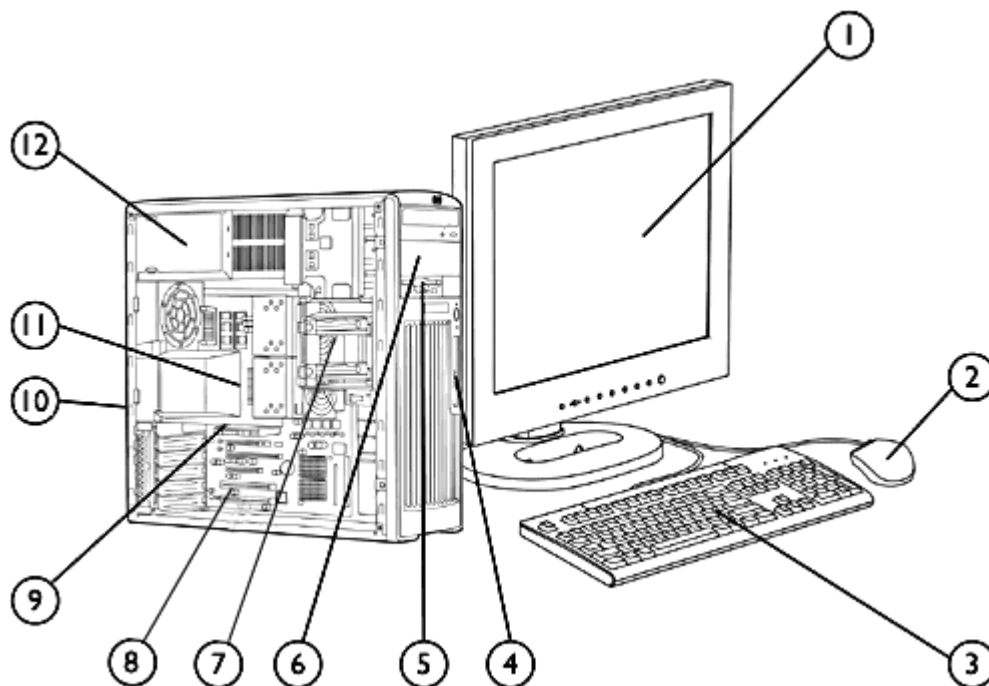


## Overview

HP recommends Windows Vista® Business



- |   |  |
|---|--|
| 1. Monitor (sold separately)  | 8. 2 PCI, 2 PCI Express x8 mechanical/x4 electrical  |
| 2. Mouse (USB or PS/2)  | 9. 2 PCI Express x16 Gen2 Graphics Bus   |
| 3. Standard Keyboard (USB or PS/2)  | 10. 5 USB 2.0 (rear), 1 USB 2.0 (internal), 1 standard serial port (only available via internal header with optional module), 2 PS/2, 1 RJ-45, audio line in, audio line out, and microphone in. |
| 4. Front IO: 2 USB 2.0, IEEE-1394 (optional), headphone out and microphone in | 11. Dual-Core or Quad-Core Intel® Xeon® Processors   |
| 5. 3.5" external bay for optional floppy drive                                | 12. 650 watt 80 PLUS high efficiency power supply  |
| 6. 2 external 5.25" bays  |  |
| 7. 2 internal 3.5" bays (convertible to 3 internal 2.5" bays)                 |  |

## Overview

### At A Glance

- Choice of Operating Systems:
  - Genuine Windows Vista® Business 32-bit
  - Genuine Windows Vista® Business 64-bit
  - Genuine Windows Vista® 32-bit downgrade to Genuine Microsoft® Windows® XP Professional 32-bit
  - Genuine Windows Vista® 64-bit downgrade to Genuine Microsoft® Windows® XP Professional 64-bit
  - Red Hat Enterprise Linux® WS 4 64-bit
- HP Linux Installer Kit for Linux (includes drivers for both 32-bit & 64-bit OS versions of Red Hat Enterprise Linux WS4 and WS5 see: <http://www.hp.com/workstations/software/linux>)
- Quad-Core Intel® Xeon® Processor 5400 Sequence (12 MB L2 cache) or Dual-Core Intel Xeon Processor 5200 Sequence (6 MB L2 cache)
- 1333 MHz Front Side Bus support
- 4-channel 667 MHz FB-DIMM Memory Subsystem
- Up to 32 GB Memory capacity with 8 DIMM slots and 4 GB DIMMs
- PCI Express I/O and PCIe x16 G2
- Integrated Broadcom 5755 Gigabit LAN on Motherboard (LoM)
- 6 channels of Serial ATA (SATA) 3.0 Gb/s natively supported internally
- SATA RAID 0 and RAID 1 support standard on motherboard
- SAS RAID 0 and RAID 1 supported using the LSI 3041E PCIe controller
- SATA optical drives
- High Definition integrated audio with internal speaker
- ENERGY STAR compliance with energy-saving features available on selected configurations (Not supported by Linux)
- Protected by HP Services, including a 3 years parts, 3 years labor, and 3 years onsite service (3/3/3) standard warranty. Terms and conditions vary by country. Certain restrictions and exclusions apply.

## Standard Features - Custom Components

### Processor and Speed – Up to 2 of the following

#### Quad-Core Intel Xeon Processor with Intel® 64 Architecture

One or two Quad-Core Intel Xeon Processor 5400 Sequence, 12 MB total L2 cache (2 x 6 MB shared):\*

Quad-Core Intel Xeon Processor E5405/ 2.00 GHz, 1333 MHz FSB, 80 watt

Quad-Core Intel Xeon Processor E5410/ 2.33 GHz, 1333 MHz FSB, 80 watt

Quad-Core Intel Xeon Processor E5420/ 2.50 GHz, 1333 MHz FSB, 80 watt

Quad-Core Intel Xeon Processor E5430/ 2.66 GHz, 1333 MHz FSB, 80 watt

Quad-Core Intel Xeon Processor E5440/ 2.83 GHz, 1333 MHz FSB, 80 watt

Quad-Core Intel Xeon Processor E5450/ 3.00 GHz, 1333 MHz FSB, 80 watt

#### Dual-Core Intel Xeon Processors with Intel® 64 Architecture

One or two Dual-Core Intel Xeon Processor 5200 Sequence\*

Intel Xeon E5205/ 1.86GHz, 6 MB L2, 1066 MHz FSB, 65 watt

Intel Xeon E5240/ 3.00GHz, 6 MB L2, 1333 MHz FSB, 65 watt

Intel Xeon X5260/ 3.33 GHz, 6 MB L2, 1333 MHz FSB, 80 watt

\* When ordering two processors, the second processor must be the same as the first. Intel processor numbers are not a measurement of higher performance. Processor numbers differentiate features within each processor family, not across different processor families. See:

[http://www.intel.com/products/processor\\_number/](http://www.intel.com/products/processor_number/) for details. Intel® 64 Architecture requires a computer system with a processor, chipset, BIOS, operating system, device drivers, and applications enabled for Intel 64 Architecture. Processor will not operate (including 32-bit operation) without an Intel 64 Architecture -enabled BIOS. Performance will vary depending on your hardware and software configurations. See: <http://www.intel.com/technology/64bitextensions> for more information. Quad-Core and Dual-Core are new technologies designed to improve performance of multithreaded software products and hardware-aware multitasking operating systems and may require appropriate operating system software for full benefits; check with software provider to determine suitability; Not all customers or software applications will necessarily benefit from use of these technologies.

### Operating System – One of the following

Genuine Windows Vista® Business 64-bit

Genuine Windows Vista® Business 32-bit

Genuine Windows Vista® 64-bit downgrade to Genuine Microsoft® Windows® XP Professional 64-bit (expected available until August 2008)

Genuine Windows Vista® 32-bit downgrade to Genuine Microsoft® Windows® XP Professional 32-bit (expected available until August 2008)

HP Linux Installer Kit (see: <http://www.hp.com/workstations/software/linux>):

Red Hat Enterprise Linux Workstation 4 (Update 6 or later) (32- or 64-bit version)

For detailed OS/hardware support information for Linux, see:

[http://www.hp.com/support/linux\\_hardware\\_matrix](http://www.hp.com/support/linux_hardware_matrix)

## Standard Features - Custom Components

1-3 Hard Disk Drives – Up to 2 of the following 3.5" SATA and 3.5" 15K SAS drives, or 3 of the 2.5" small form factor (SFF) 10K SAS drives are allowed  (2.5" SFF drives cannot be mixed with 3.5" drives)  To mix SAS and SATA drives, the first hard drive must be SAS.  (Drives cannot be mixed under Linux).	SATA Hard Drive	Windows Vista <sup>i</sup>	Windows XP	Red Hat Enterprise Linux
	80 GB 7200 rpm SATA 3.0 Gb/s drive	32-Bit, 64-Bit	32-Bit, 64-Bit	WS 4 & 5
	160 GB 7200 rpm SATA 3.0 Gb/s NCQ drive	32-Bit, 64-Bit	32-Bit, 64-Bit	WS 4 & 5
	250 GB 7200 rpm SATA 3.0Gb/s NCQ drive	32-Bit, 64-Bit	32-Bit, 64-Bit	WS 4 & 5
	500 GB 7200 rpm SATA 3.0Gb/s NCQ drive	32-Bit, 64-Bit	32-Bit, 64-Bit	WS 4 & 5
	1 TB 7200 rpm SATA 3.0Gb/s NCQ drive	32-Bit, 64-Bit	32-Bit, 64-Bit	WS 4 & 5
	80 GB 10K rpm SATA 1.5 Gb/s NCQ drive	32-Bit, 64-Bit	32-Bit, 64-Bit	WS 4 & 5
	160 GB 10K rpm SATA 1.5 Gb/s NCQ drive	32-Bit, 64-Bit	32-Bit, 64-Bit	WS 4 & 5
	<b>SAS Hard Drive</b> (SAS Controller, not integrated, is required)			
	73 GB 10K rpm SAS 2.5" Small Form Factor (SFF) drive	32-Bit, 64-Bit	32-Bit, 64-Bit	WS 4 & 5
	146 GB 10K rpm SAS 2.5" Small Form Factor (SFF) drive	32-Bit, 64-Bit	32-Bit, 64-Bit	WS 4 & 5
	73 GB 15K rpm SAS 3.0 Gb/s drive	32-Bit, 64-Bit	32-Bit, 64-Bit	WS 4 & 5
	146 GB 15K rpm SAS 3.0Gb/s drive	32-Bit, 64-Bit	32-Bit, 64-Bit	WS 4 & 5
	300 GB 15K rpm SAS 3.0Gb/s drive	32-Bit, 64-Bit	32-Bit, 64-Bit	WS 4 & 5
	450 GB 15K rpm SAS 3.0Gb/s drive	32-Bit, 64-Bit	32-Bit, 64-Bit	WS 4 & 5

Factory integrated RAID on motherboard for SATA drives (All RAID arrays must be less than 2 TB in size)		Windows Vista <sup>i</sup>	Windows XP	Red Hat Enterprise Linux
	RAID 0 Configuration – Striped Array	32-Bit, 64-Bit	32-Bit, 64-Bit	Not supported
	RAID 1 Configuration – Mirrored Array	32-Bit, 64-Bit	32-Bit, 64-Bit	Not supported
	<b>NOTE:</b> Requires 2 identical SAS hard drives (speeds, capacity, interface). RAID 1 does not support a 3rd HDD. No Linux support for SATA RAID.			

Drive controllers		Windows Vista <sup>i</sup>	Windows XP	Red Hat Enterprise Linux
	Integrated SATA 3.0 Gb/s Controller, RAID 0, 1, 10, 5 supported	All RAID levels supported but only RAID 0, 1 is configure-to-order	All RAID levels supported but only RAID 0, 1 is configure-to-order	WS 4/DT5 (HW RAID functionality not supported by Linux)
	LSI 3041E x4 PCIe 4-port SAS/SATA Controller with RAID 0,1,10 support	32-Bit, 64-Bit	32-Bit, 64-Bit	S4/DT5 (RAID 0.1 only)

## Standard Features - Custom Components

Memory – One of the following	PC2-5300F DDR2-667 ECC registered Fully Buffered – DIMMs	Windows Vista <sup>i</sup>	Windows XP	Red Hat Enterprise Linux
	1 GB (2 x 512 MB)	32-Bit, 64-Bit	32-Bit, 64-Bit	WS 4 & 5
	2 GB (2 x 1 GB)	32-Bit, 64-Bit	32-Bit, 64-Bit	WS 4 & 5
	3 GB (2 x 1GB + 2 x 512 MB)	32-Bit, 64-Bit	32-Bit, 64-Bit	WS 4 & 5
	4 GB (2 x 2 GB)	32-Bit, 64-Bit	32-Bit, 64-Bit	WS 4 & 5
	4 GB (4 x 1 GB)	32-Bit, 64-Bit	32-Bit, 64-Bit	WS 4 & 5
	8 GB (4 x 2 GB)	32-Bit, 64-Bit	32-Bit, 64-Bit	WS 4 & 5
	8 GB (8 x 1 GB)	32-Bit, 64-Bit	32-Bit, 64-Bit	WS 4 & 5
	16 GB (4x 4 GB)	32-Bit, 64-Bit	32-Bit, 64-Bit	WS 4 & 5
	16 GB (8x 2 GB)	32-Bit, 64-Bit	32-Bit, 64-Bit	WS 4 & 5
	32 GB (8x 4 GB)	32-Bit, 64-Bit	32-Bit, 64-Bit	WS 4 & 5

1 -2 Removable storage		Windows Vista <sup>i</sup>	Windows XP	Red Hat Enterprise Linux
Up to 2 optical drives	<b>FDD Floppy drive</b>			
	1.44-MB Diskette Drive (optional)	32-Bit, 64-Bit	32-Bit, 64-Bit	WS 4 & 5
	<b>Optical drives</b>			
	SATA16X DVD-ROM Drive*	32-Bit, 64-Bit	32-Bit, 64-Bit	WS 4 & 5
	SATA SuperMulti DVD +/-RW LightScribe Drive**	32-Bit, 64-Bit	32-Bit, 64-Bit	WS 4 & 5

\* Not supported as a 2nd Optical Drive.

\*\* LightScribe software works with Windows only. LightScribe creates a grayscale image similar to black and white photography. LightScribe media required and sold separately. Double-layer discs can store more data than single layer discs. However, double-layer discs burned with this drive may not be compatible with many existing single-layer DVD drives and players

Keyboard – One of the following		Windows Vista <sup>i</sup>	Windows XP	Red Hat Enterprise Linux
	PS/2 Standard Keyboard	32-Bit, 64-Bit	32-Bit, 64-Bit	WS 3, WS 4
	USB Standard Keyboard	32-Bit, 64-Bit	32-Bit, 64-Bit	WS 3, WS 4

Mouse – One of the following		Windows Vista <sup>i</sup>	Windows XP	Red Hat Enterprise Linux
	HP USB Laser Mouse	32-Bit, 64-Bit	32-Bit, 64-Bit	WS 4 & 5
	PS/2 2-Button Scroll Mouse (mechanical)	32-Bit, 64-Bit	32-Bit, 64-Bit	WS 4 & 5
	USB 2-Button Scroll Mouse (optical)	32-Bit, 64-Bit	32-Bit, 64-Bit	WS 4 & 5
	USB 3-Button Mouse (optical)	32-Bit, 64-Bit	32-Bit, 64-Bit	WS 4 & 5

## Standard Features - Custom Components

Audio	Windows Vista <sup>i</sup>	Windows XP	Red Hat Enterprise Linux
HP Thin USB Powered Speakers	32-Bit, 64-Bit	32-Bit, 64-Bit	WS 4 & 5
High Definition Integrated Realtek ALC262 Audio with internal speaker	32-Bit, 64-Bit	32-Bit, 64-Bit	WS 4 & 5
SoundBlaster® X-Fi™ XtremeGamer PCI Audio Card	32-Bit, 64-Bit	32-Bit, 64-Bit	WS 4 & 5 Not Supported
NIC	Windows Vista <sup>i</sup>	Windows XP	Red Hat Enterprise Linux
Integrated Broadcom 5755 PCIe LOM Controller	32-Bit, 64-Bit	32-Bit, 64-Bit	WS 4 & 5
Broadcom BCM5751 NetXtreme™ Gigabit Ethernet Controller (PCIe)	32-Bit, 64-Bit	32-Bit, 64-Bit	WS 4 & 5
PCI Express Graphics	Windows Vista <sup>i</sup>	Windows XP	Red Hat Enterprise Linux
NVIDIA Quadro NVS 290 PCIe (256 MB) – 1 or 2 of these cards are supported – 2nd card must be NVS 440 or NVS 290	32-Bit, 64-Bit	32-Bit, 64-Bit	WS 4 & 5
NVIDIA Quadro NVS 440 PCIe (256 MB) – Single NVS 440 or NVS 290 + NVS 440 supported.	32-Bit, 64-Bit	32-Bit, 64-Bit	WS 4 & 5
NVIDIA Quadro FX 370 PCIe (256 MB) – 1 or 2 of these cards are supported.*	32-Bit, 64-Bit	32-Bit, 64-Bit	WS 4 & 5
NVIDIA Quadro FX 570 PCIe (256 MB) – 1 or 2 of these cards are supported *	32-Bit, 64-Bit	32-Bit, 64-Bit	WS 4 & 5
ATI FireGL V5600 PCIe (512 MB) – 1 or 2 of these cards are supported *	32-Bit, 64-Bit	32-Bit, 64-Bit	Not supported
NVIDIA Quadro FX 1700 PCIe (512 MB) – 1 or 2 of these cards are supported *	32-Bit, 64-Bit	32-Bit, 64-Bit	WS 4 & 5
NVIDIA Quadro FX 3500 PCIe (256 MB) – single card only	32-Bit, 64-Bit	32-Bit, 64-Bit	WS 4 & 5
NVIDIA Quadro FX 3700 PCIe (512 MB) – single card only	32-Bit, 64-Bit	32-Bit, 64-Bit	WS 4 & 5
NVIDIA Quadro FX 4600 PCIe (768 MB) – single card only	32-Bit, 64-Bit	32-Bit, 64-Bit	WS 4 & 5
* 2nd graphics card must match 1st.			

## Standard Features - Custom Components

Miscellaneous	Windows Vista <sup>i</sup>	Windows XP	Red Hat Enterprise Linux
IEEE 1394a FireWire* 400 3-Port PCI Card	32-Bit, 64-Bit	32-Bit, 64-Bit	Not Supported
IEEE 1394b FireWire* 800 3-Port PCI Card	Not supported	32-Bit, 64-Bit	Not Supported
HP ENERGY STAR 4.0 Enabled Configuration	Not supported	32-Bit, 64-Bit	Not Supported
HP Workstation Mouse Pad	N/A	N/A	N/A
Solenoid Hood Lock & Hood Sensor	All	All	All

\* Maximum of one FireWire card in a system at a time is supported.

Software	Windows Vista <sup>i</sup>	Windows XP	Red Hat Linux
<b>Standard</b>			
Alert Standard Format specification	32-Bit, 64-Bit	32-Bit, 64-Bit	N/A
HP Performance Tuning Framework	32-Bit, 64-Bit	32-Bit, 64-Bit	N/A
Roxio Easy Media Creator (CD or DVD burner)	32-Bit, 64-Bit	32-Bit, 64-Bit	N/A
Intervideo WinDVD with DVD player	32-Bit, 64-Bit	32-Bit, 64-Bit	N/A
HP Backup and Recovery	32-Bit, 64-Bit	32-Bit, 64-Bit	N/A
PDF Complete	32-Bit, 64-Bit	32-Bit, 64-Bit	N/A
<b>Optional</b>			
Microsoft Office 2007 Small Business Edition	32-Bit	32-Bit, 64-Bit	N/A
Microsoft Office 2007 Trial Edition	32-Bit	32-Bit, 64-Bit	N/A
HP Client Manager Software v6.2 (optional download)	32-Bit, 64-Bit	32-Bit, 64-Bit	N/A
HP ProtectTools Security	32-Bit, 64-Bit	32-Bit	N/A

## Standard Features - Specs

Form Factor	Minitower	
Color	Carbonite/Alloy metallic	
Expansion Slots (see system board section for more details)	2 PCI slots (full-length) 2 PCI Express x16 Gen2 graphics 2 PCI Express (x8 connectors, x4 electrically)	
Bays (see storage section for more details)	Total Bays = 5 with 3.5" HDDs, or 6 with 2.5" HDDs	
Front I/O	2 USB 2.0, 1 headphone out, Microphone, optional IEEE 1394a <b>NOTE:</b> Although HP Personal Workstations can be ordered with the HP Installer Kit for Linux and an IEEE 1394 card, HP cannot provide customer support for this configuration. Please refer to the Linux Hardware Support Matrix ( <a href="http://www.hp.com/support/linux_hardware_matrix">http://www.hp.com/support/linux_hardware_matrix</a> ) for details, and to the Linux User Manual ( <a href="http://www.hp.com/support/linux_user_manual">http://www.hp.com/support/linux_user_manual</a> ) for tips on user-enablement of the IEEE 1394 Card.	
Internal I/O	1 USB 2.0 header, 1 serial port header for optional rear serial connector module.	
Rear I/O	5 USB 2.0, PS/2 keyboard and mouse, 1 RJ-45 to integrated Gigabit LAN, 1 audio line in, 1 audio line out, 1 microphone in; audio ports can be retasked to function as line in, line out, microphone, or headphone.	
Chassis Dimensions (H x W x D)	17.3 x 6.5 X 17.3 inches; 44.1 x 16.5 x 44.0 cm	
System Weight	Exact weights depend upon configuration Minimum: 31.7 lbs (14.4 kg) Standard: 37.2 lbs (16.9 kg) Maximum: 42.7 lbs (19.4 kg)	
Temperature	Operating	40° to 95° F (5° to 35° C)
	Non-operating	-40° to 140° F (-40° to 60° C)
Humidity	Operating	8% to 85%
	Non-operating	8% to 90%
Maximum Altitude (nonpressurized)	Operating	10,000 ft (3,000 m)
	Non-operating	30,000 ft (9,100 m)
Power Supply	650W, 80 PLUS®, wide-ranging, active Power Factor Correction	
Interfaces Supported	-channel SATA interface (6 Serial-ATA connectors; 2 are eSATA configurable for use with eSATA After Market Option kit), USB 2.0, IEEE 1394 (optional)	
Hard Drive Controller Supported	SATA (integrated) or optional SAS (PCIe) controllers	



## Standard Features - Preconfigured Global SKU's

xw6600T/XW2.33+ /D80/R4.0/290d/s FE022AW#ABA	OS	Microsoft Vista32B Downgrade to XP32B OS *
	Base unit	HP xw6600 Workstation base unit
	Localization kit	HP xw6600 Workstation localization kits
	Processor 1	Quad-Core Intel Xeon Processor E5410/ 2.33 GHz, 1333 MHz FSB, 80 watt
	Processor 2	Quad-Core Intel Xeon Processor E5410/ 2.33 GHz, 1333 MHz FSB, 80 watt
	Memory	4 GB (4 x 1 GB) PC2-5300F DDR2-667 ECC
	Hard Drive	HP 80 GB 7200 rpm SATA 3.0Gb/s
	Controller	NA
	Optical Drive	SATA 16X DVD-ROM
	Graphics	NVIDIA Quadro NVS 290 PCIe (256 MB)
	Floppy disk drive	NA
	Keyboard	HP PS/2 standard keyboard
	Mouse	HP PS/2 scroll mouse
	Security	HP ProtectTools Security Software

xw6600Q/XW2.33+ /D80/R4.0/Xd/s FE023AW#ABA	OS	Microsoft Windows Vista Business 32 OS
	Base unit	HP xw6600 Workstation base unit
	Localization kit	HP xw6600 Workstation localization kits
	Processor 1	Quad-Core Intel Xeon Processor E5410/ 2.33 GHz, 1333 MHz FSB, 80 watt
	Processor 2	Quad-Core Intel Xeon Processor E5410/ 2.33 GHz, 1333 MHz FSB, 80 watt
	Memory	4 GB (4 x 1 GB) PC2-5300F DDR2-667 ECC
	Hard Drive	HP 80 GB 7200 rpm SATA 3.0Gb/s
	Controller	NA
	Optical Drive	SATA 16X DVD-ROM
	Graphics	NA
	Floppy disk drive	NA
	Keyboard	HP PS/2 standard keyboard
	Mouse	HP PS/2 scroll mouse
	Security	HP ProtectTools Security Software

### Standard Features - Preconfigured Global SKU's

xw6600T/XW3.00+ /F250/R4.0/290+d/p KX876AW#ABA	OS	Microsoft Vista32B Downgrade to XP32B OS *
	Base unit	HP xw6600 Workstation base unit
	Localization kit	HP xw6600 Workstation localization kits
	Processor 1	Quad-Core Intel Xeon Processor E5450/ 3.00 GHz, 1333 MHz FSB, 80 watt
	Processor 2	Quad-Core Intel Xeon Processor E5450/ 3.00 GHz, 1333 MHz FSB, 80 watt
	Memory	4 GB (4 x 1 GB) PC2-5300F DDR2-667 ECC
	Hard Drive	HP 250GB SATA 3Gb/s NCQ 7200 1st HDD
	Controller	NA
	Optical Drive	SATA 16X DVD-ROM
	Graphics 1	NVIDIA Quadro NVS 290 PCIe (256 MB)
	Graphics 2	NVIDIA Quadro NVS 290 PCIe (256 MB)
	Floppy disk drive	NA
	Keyboard	HP USB standard keyboard
	Mouse	HP USB optical 2-button mouse
	Security	HP ProtectTools Security Software
	Energy Star	HP Energy Star 4.0 Enabled Configuration

## Standard Features - Preconfigured Regional Models

xw6600T/XW2.33/  
F160/R2.0/290z/p  
RB439UA#ABA

OS	Microsoft Vista32B Downgrade to XP32B OS
Base unit	HP xw6600 Workstation
Chassis	HP 650W 80 PLUS Energy Efficient Chassis
Country kit	HP xw6600 Localization Kit
Processor	Intel Xeon 5410 2.33 12M/1333 QC 1st CPU
Memory	HP 2GB (2x1GB) DDR2-667 ECC FBD RAM
Hard Drive	HP 160GB SATA 3Gb/s NCQ 7200 1st HDD
Optical Drive	HP 16X DVD+-RW SuperMulti SATA 1st Drive
Graphics	NVIDIA Quadro NVS 290 256MB PCIe
Floppy disk drive	HP No Floppy Disk Option
Keyboard	HP PS/2 Standard Keyboard
Mouse	HP USB Optical Scroll Mouse
Other	Microsoft Office 2007 Trial Software

xw6600T/XW2.50/  
F250/R4/FX570z/p  
RB440UA#ABA

OS	Microsoft Vista32B Downgrade to XP32B OS
Base unit	HP xw6600 Workstation
Chassis	HP 650W 80 PLUS Energy Efficient Chassis
Country kit	HP xw6600 Localization Kit
Processor	Intel Xeon 5420 2.50 12M/1333 QC 1st CPU
Memory	HP 4GB (4x1GB) DDR2-667 ECC FBD RAM
Hard Drive	HP 250GB SATA 3Gb/s NCQ 7200 1st HDD
Optical Drive	HP 16X DVD+-RW SuperMulti SATA 1st Drive
Graphics	NVIDIA Quadro FX570 256MB PCIe Graphics
Floppy disk drive	HP No Floppy Disk Option
Keyboard	HP PS/2 Standard Keyboard
Mouse	HP USB Optical Scroll Mouse
Other	Microsoft Office 2007 Trial Software

Standard Features - Preconfigured Regional Models

xw6600T/XW2.83/ F250/R4/FX17z/p RB441UA#ABA	OS	Microsoft Vista32B Downgrade to XP32B OS
	Base unit	HP xw6600 Workstation
	Chassis	HP 650W 80 PLUS Energy Efficient Chassis
	Country kit	HP xw6600 Localization Kit
	Processor	Intel Xeon 5440 2.83 12M/1333 QC 1st CPU
	Memory	HP 4GB (4x1GB) DDR2-667 ECC FBD RAM
	Hard Drive	HP 250GB SATA 3Gb/s NCQ 7200 1st HDD
	Optical Drive	HP 16X DVD+-RW SuperMulti SATA 1st Drive
	Graphics	NVIDIA Quadro FX1700 512MB PCIe Graphics
	Floppy disk drive	HP No Floppy Disk Option
	Keyboard	HP PS/2 Standard Keyboard
	Mouse	HP USB Optical Scroll Mouse
	Other	Microsoft Office 2007 Trial Software

## After-Market Options

Processors		Part Number
	<b>2nd Quad-Core Intel® Xeon® processor 5400 Series with Intel64 Architecture, and 12 MB of L2 cache (2x6 MB shared)</b>	
	Quad-Core Intel Xeon Processor E5405/ 2.00 GHz, 1333 MHz FSB, 80 watt	GX569AA
	Quad-Core Intel Xeon Processor E5410/ 2.33 GHz, 1333 MHz FSB, 80 watt	GX570AA
	Quad-Core Intel Xeon Processor E5420/ 2.50 GHz, 1333 MHz FSB, 80 watt	GX571AA
	Quad-Core Intel Xeon Processor E5430/ 2.66 GHz, 1333 MHz FSB, 80 watt	GX572AA
	Quad-Core Intel Xeon Processor E5440/ 2.83 GHz, 1333 MHz FSB, 80 watt	GX573AA
	Quad-Core Intel Xeon Processor E5450/ 3.00 GHz, 1333 MHz FSB, 80 watt	GX574AA
	<b>2nd Dual-Core Intel Xeon processor 5200 Series with Intel® 64 Architecture, and 6 MB of Shared L2 cache</b>	
	Intel Xeon E5205/ 1.86GHz, 6MB L2, 1066 MHz FSB, 65 watt	GX566AA
	Intel Xeon E5240/ 3.00GHz, 6MB L2, 1333 MHz FSB,	KY198AA
	Intel Xeon X5260/ 3.33 GHz, 6MB L2, 1333 MHz FSB, 80 watt	GX568AA

\* When ordering two processors, the second processor must be the same as the first. Intel processor numbers are not a measurement of higher performance. Processor numbers differentiate features within each processor family, not across different processor families. See: [http://www.intel.com/products/processor\\_number/](http://www.intel.com/products/processor_number/) for details. Intel® 64 Architecture requires a computer system with a processor, chipset, BIOS, operating system, device drivers, and applications enabled for Intel 64 Architecture. Processor will not operate (including 32-bit operation) without an Intel 64 Architecture -enabled BIOS. Performance will vary depending on your hardware and software configurations. See: <http://www.intel.com/technology/64bitextensions> for more information.

Quad-Core and Dual-Core are new technologies designed to improve performance of multithreaded software products and hardware-aware multitasking operating systems and may require appropriate operating system software for full benefits; check with software provider to determine suitability; Not all customers or software applications will necessarily benefit from use of these technologies.

Graphics (PCI Express)	Multi display solutions	Windows Vista <sup>1</sup>	Windows XP	Red Hat Enterprise Linux	Part Number
	<b>Professional 2D</b>				
	NVIDIA Quadro NVS 290 PCIe (256 MB) – 1 or 2 of these cards are supported – 2nd card can be NVS 440 or NVS 290	32-Bit, 64-Bit	32-Bit, 64-Bit	WS 4 & 5	GN502AA
	NVIDIA Quadro NVS 440 PCIe (256 MB) – 1 or 2 of these cards are supported – 2nd card can be NVS 440 or NVS 290	32-Bit, 64-Bit	32-Bit, 64-Bit	WS 4 & 5	PT453A
	HP 'DMS-59 to Dual VGA' Cable Kit	32-Bit, 64-Bit	32-Bit, 64-Bit	WS 4 & 5	GS567AA
	<b>Entry 3D</b>				

## After-Market Options

NVIDIA Quadro FX 370 PCIe (256 MB) – 1 or 2 of these cards are supported – 2nd card must match first	32-Bit, 64-Bit	32-Bit, 64-Bit	WS 4 & 5	GP528AA
NVIDIA Quadro FX 570 PCIe (256 MB) – 1 or 2 of these cards are supported – 2nd card must match first	32-Bit, 64-Bit	32-Bit, 64-Bit	WS 4 & 5	GR521AA
<b>Mid-range 3D</b>				
ATI FireGL V5600 PCIe (512 MB) – 1 or 2 of these cards are supported – 2nd card must match first	32-Bit, 64-Bit	32-Bit, 64-Bit	Not supported	GT346AA
NVIDIA Quadro FX1700 PCIe (512 MB) – 1 or 2 of these cards are supported – 2nd card must match first	32-Bit, 64-Bit	32-Bit, 64-Bit	WS 4 & 5	GP529AA
<b>High-end 3D</b>				
NVIDIA Quadro FX 3700 PCIe (512 MB) – single card only	32-Bit, 64-Bit	32-Bit, 64-Bit	WS 4 & 5	KD506AA
NVIDIA Quadro FX 4600 PCIe (768 MB) – single card only	32-Bit, 64-Bit	32-Bit, 64-Bit	WS 4 & 5	RV706AA

Hard Drives	SATA Hard Drives	Windows Vista <sup>i</sup>	Windows XP	Red Hat Enterprise Linux	Part Number
	80 GB 7200 rpm SATA 3.0Gb/s drive	32-Bit, 64-Bit	32-Bit, 64-Bit	WS 4 & 5	PY276AA
	160 GB 7200 rpm SATA 3.0Gb/s NCQ drive	32-Bit, 64-Bit	32-Bit, 64-Bit	WS 4 & 5	PV944A
	250 GB 7200 rpm SATA 3.0Gb/s NCQ drive	32-Bit, 64-Bit	32-Bit, 64-Bit	WS 4 & 5	EA788AA
	500 GB 7200 rpm SATA 3.0Gb/s NCQ drive	32-Bit, 64-Bit	32-Bit, 64-Bit	WS 4 & 5	PV943A
	1 TB 7200 rpm SATA 3.0Gb/s NCQ drive	32-Bit, 64-Bit	32-Bit, 64-Bit	WS 4 & 5	GE262AA
	80 GB 10K rpm SATA NCQ drive	32-Bit, 64-Bit	32-Bit, 64-Bit	WS 4 & 5	EM172AA
	160 GB 10K rpm SATA NCQ drive	32-Bit, 64-Bit	32-Bit, 64-Bit	WS 4 & 5	EW222AA
	<b>3.5" SAS Hard Drives</b>				
	73 GB 15K rpm SAS 3.0 Gb/s drive	32-Bit, 64-Bit	32-Bit, 64-Bit	WS 4 & 5	EA329AA
	146 GB 15K rpm SAS 3.0 Gb/s drive	32-Bit, 64-Bit	32-Bit, 64-Bit	WS 4 & 5	EA330AA

## After-Market Options

300 GB 15K rpm SAS 3.0 Gb/s drive	32-Bit, 64-Bit	32-Bit, 64-Bit	WS 4 & 5	EM174AA
450 GB 15K rpm SAS 3.0 Gb/s drive	32-Bit, 64-Bit	32-Bit, 64-Bit	WS 4 & 5	FM803AA
<b>2.5" SAS Small Form Factor Hard Drives</b>				
73 GB 10K rpm SAS drive	32-Bit, 64-Bit	32-Bit, 64-Bit	WS 4 & 5	GE259AA
146 GB 10K rpm SAS drive	32-Bit, 64-Bit	32-Bit, 64-Bit	WS 4 & 5	GE261AA

Controllers	Windows Vista <sup>i</sup>	Windows XP	Red Hat Enterprise Linux	Part Number
PCIe LSI SAS3041E 4-Port, Controller (Native Command Queuing is not supported on this card at this time.)	32-Bit, 64-Bit	32-Bit, 64-Bit	WS 4 & 5	EH417AA
LSI MegaRAID SAS 8888ELP 8-port, PCIe SAS RAID Controller	32-Bit, 64-Bit (RAID 5, 10 not supported)	32-Bit, 64-Bit	WS 4 & 5	GE258AA

**NOTE:** Specific user-configured hardware SAS RAID configurations are supported on this system with Linux. Please visit: [http://www.hp.com/support/linux\\_hardware\\_matrix](http://www.hp.com/support/linux_hardware_matrix) for details.

1394 FireWire PCI Cards	Windows Vista <sup>i</sup>	Windows XP	Red Hat Enterprise Linux	Part Number
IEEE 1394a FireWire 400 3-Port PCI Card	32-Bit, 64-Bit	32-Bit, 64-Bit	Not supported	PA997A
IEEE 1394b FireWire 800 3-Port PCI Card	Not supported	32-Bit, 64-Bit	Not supported	EA327AA

Input/Output Devices	Keyboards	Windows Vista <sup>i</sup>	Windows XP	Red Hat Enterprise Linux	Part Number
	HP PS/2 Standard Keyboard (Carbonite/Silver)	32-Bit, 64-Bit	32-Bit, 64-Bit	WS 4 & 5	DT527A
	HP USB Standard Keyboard (Carbonite/Silver)	32-Bit, 64-Bit	32-Bit, 64-Bit	WS 4 & 5	DT528A
	HP USB Smartcard Keyboard	32-Bit, 64-Bit	32-Bit, 64-Bit	Not supported	ED707AA
	<b>Pointing Devices</b>				
	HP USB Laser Mouse	32-Bit, 64-Bit	32-Bit, 64-Bit	WS 4 & 5	GW405AA
	HP USB 2-Button Scroll Mouse (optical) (Carbonite/Silver)	32-Bit, 64-Bit	32-Bit, 64-Bit	WS 4 & 5	DC172B
	HP USB 3-Button Mouse (optical)	32-Bit, 64-Bit	32-Bit, 64-Bit	WS 4 & 5	DY651A
	USB SpacePilot	32-Bit, 64-Bit	32-Bit, 64-Bit	Not supported	EF390AA
	HP USB SpaceExplorer	32-Bit, 64-Bit	32-Bit, 64-Bit	Not Supported	RY429AA

## After-Market Options

Networking	NICs	Windows Vista <sup>i</sup>	Windows XP	Red Hat Enterprise Linux	Part Number
	Broadcom BCM5751 NetXtreme Gigabit Ethernet Controller (PCIe)	32-Bit, 64-Bit	32-Bit, 64-Bit	WS 4 & 5	EA833AA
Memory modules	PC2-5300F DDR2-667 ECC registered Fully Buffered – DIMMs	Windows Vista <sup>i</sup>	Windows XP	Red Hat Enterprise Linux	Part Number
	512 MB (1 x 512 MB)	32-bit, 64-bit (supported with minimum of 1GB of total system memory)	32-Bit, 64-Bit	WS 4 & 5	EM159AA
	1 GB (1 x 1 GB)	32-Bit, 64-Bit	32-Bit, 64-Bit	WS 4 & 5	EM160AA
	2 GB (1 x 2 GB)	32-Bit, 64-Bit	32-Bit, 64-Bit	WS 4 & 5	EM161AA
	4 GB (1 x 4 GB)	32-Bit, 64-Bit	32-Bit, 64-Bit	WS 4 & 5	EM162AA
Monitors	TFT display				Part Number
(Supported by all Operating Systems available from HP)	HP LP3065 30-inch Widescreen LCD Monitor				EZ320A4
	HP LP2465 24-inch Widescreen LCD Monitor				EF224A4
	HP LP2065 20-inch LCD Monitor				EF227A4
	HP L1965 19-inch LCD Monitor				RA373AA
Removable Storage		Windows Vista <sup>i</sup>	Windows XP	Red Hat Enterprise Linux	Part Number
	<b>FDD Floppy drive</b>				
	1.44 MB Diskette Drive (1 only)	32-Bit, 64-Bit	32-Bit, 64-Bit	WS 4 & 5	DY670A
	<b>Optical drives</b>				
	SATA 16X DVD-ROM Drive*	32-Bit, 64-Bit	32-Bit, 64-Bit	WS 4 & 5	EW268AA
	SATA SuperMulti DVD+/-RW with LightScribe**	32-Bit, 64-Bit	32-Bit, 64-Bit	WS 4 & 5	EW269AA
	<b>Other options</b>				
	HP 16-In-1 Media Card Reader with PCI Card 3Q	32-Bit, 64-Bit	32-Bit, 64-Bit	WS 4 & 5	EM718AA
	* Cannot be 2nd drive				
	** LightScribe software works with Windows only. LightScribe creates a grayscale image similar to black and white photography. LightScribe media required and sold separately. Double-layer discs can store more data than single layer discs. However, double-layer discs burned with this drive may not be compatible with many existing single-layer DVD drives and players				



## After-Market Options

Audio	Windows Vista	Windows XP	Red Hat Linux	Part Number
HP Satellite Stereo Speakers	32-Bit, 64-Bit	32-Bit, 64-Bit	WS 4 & 5	ZD929AA
HP USB Powered Speakers	32-Bit, 64-Bit	32-Bit, 64-Bit	WS 4 & 5	RD628AA
SoundBlaster X-Fi	32-Bit, 64-Bit	32-Bit, 64-Bit	WS 4 & 5	GE257AA
XtremeGamer Audio Card				

Brackets/Rack Kits	Part Number
xw64 Depth Adjustable Sliding Rail Rack Kit	DY663AA
HP Optical Bay HDD Mounting Bracket	DY659AA

Other Devices	Part Number
HP Internal USB Port Kit	EM165AA
HP Power Cord Kit	DM293A
Serial Port Kit	012711-001

Security features	Part Number
HP Business PC Security Lock Kit	PV606AA
Kensington Security Cable & Lock	PC766A
HP Solenoid Hood Lock/Sensor Kit	DE618A

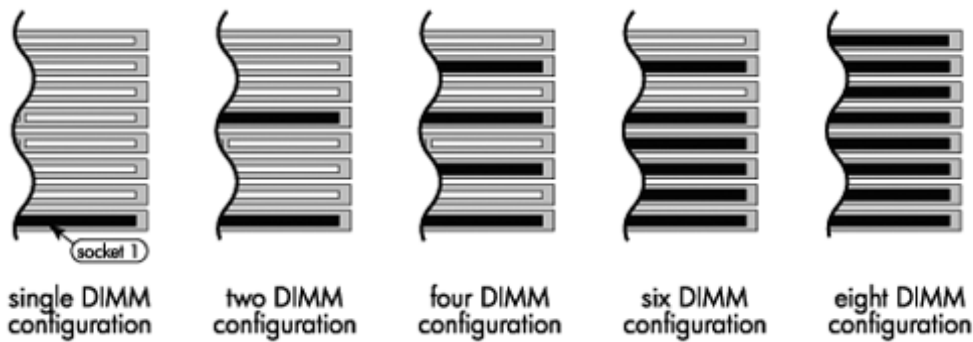
Application Software	Windows Vista <sup>i</sup>	Windows XP	Red Hat Enterprise Linux	Part Number
HP RGS PC 3-year Software Assurance	No	Yes	No (RGS Workstation Only)	GN039AA
Software				
HP RGS V5 PC Edition	No	Yes	No	GN038AA
HP RGS V5 Receiver Site License	No	Yes (Free Download)	Yes (Free Download)	GN034AA
HP RGS V5 Workstation Edition	No	Yes	Yes	GN035AA
HP RGS Workstation 3-year Software Assurance	No	Yes	Yes	GN036AA

Memory

Intel 5400X Chipset

Requires PC2-5300F DDR2-667 ECC Registered Fully Buffered DIMMs.

The Intel 5400chipset supports ECC Registered DDR2 667 MHz FB-DIMMs only. The motherboard has 8 DIMM slots. Use only fully buffered, PC2-5300F DIMMs. Match multiple DIMMs by size and type. Use HP memory only.



If using only one DIMM, install in socket 1 (bottom DIMM slot when rear inputs/outputs of motherboard are facing left). If using 2 DIMMs, install in sockets 1 & 5, matched by size and type. For more than two DIMMs, pairs **MUST** be matched by size and type in sockets 1 and 3, 5 and 7, 2 and 4, and 6 and 8; this may require moving the DIMM in socket 5 to socket 3.

MAXIMUM MEMORY

Supports up to 32 GB of DDR2 FB-DIMM SDRAM.

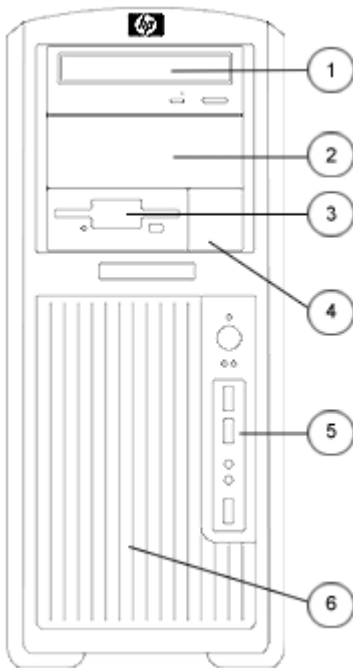
POSSIBLE MEMORY CONFIGURATIONS

Not all memory configurations possible are represented below.

DIMM Size	Slot							
	1	2	3	4	5	6	7	8
512 MB	512 MB							
1 GB	1 GB							
1 GB	512 MB				512 MB			
2 GB	1 GB				1 GB			
2 GB	512 MB		512 MB		512 MB		512 MB	
4 GB	2 GB				2 GB			
4 GB	1 GB		1 GB		1 GB		1 GB	
4 GB	512 MB	512 MB	512 MB	512 MB	512 MB	512 MB	512 MB	512 MB
6 GB	1 GB	1 GB	1 GB	1 GB	1 GB		1 GB	
8 GB	2 GB		2 GB		2 GB		2 GB	
8 GB	1 GB	1 GB	1 GB	1 GB	1 GB	1 GB	1 GB	1 GB
16 GB	2 GB	2 GB	2 GB	2 GB	2 GB	2 GB	2 GB	2 GB
32 GB	4 GB	4 GB	4 GB	4 GB	4 GB	4 GB	4 GB	4 GB

Storage

Tower configuration



Minitower

Optional Floppy Drive

5.25" storage drive bays (position 1 drive bay is limited to 198 mm depth when optional smart cover solenoid lock is installed; position 2 drive bay can be converted to an internal 3.5" 3rd hard drive bay with optional bracket)

3.5" storage drive bays with acoustic dampening rail assemblies

Or configure three 2.5" drives in the chassis instead of two 3.5" drives.

Quantity Supported	Position Supported	Controller
1	3	FDD
2	1, 2	SATA
2 (3)	4 (and 2, for 3rd drive using optical bay)	SATA or optional SAS Factory Integrated RAID*
3	4	These are SAS drives and require the SAS controller.

SATA and SAS may be mixed only in a Windows configuration and with the inclusion of an optional SAS controller. Here are the rules for mixing hard drives:

1. The boot/data drive must be

## Storage

SATA to load before any SAS drive.

2. Any size or speeds may be chosen for drives  
In non-mixed Microsoft Windows and Linux systems, rules 2 & 3 apply.

Configure-to-order RAID configs must all have the same size/speed hard drives.

Up to 6 channels of SATA can be supported natively.

\* Factory Integrated RAID 0 Configuration (Striped Array) and RAID 1 Configuration (Mirrored Array) requires 2 hard drives with identical speeds, capacity and interface. Specific user-configured hardware SAS RAID configurations are supported on this system with Linux. Please visit: [http://www.hp.com/support/linux\\_hardware\\_matrix](http://www.hp.com/support/linux_hardware_matrix) for details.

## Technical Specifications

<b>System Board</b>	
Chipset	Intel® 5400
Super I/O Controller	SMSC SCH5327
System Board Form Factor	9.8"x12.0"
Processor Socket	Dual LGA 771
DIMM Connectors (FBD DDR2)	8
PCI Connectors (5.0V)	2 full length 33 MHz 32-Bit
PCI Express Connectors	2 PCI Express x16 Gen2 graphics 2 PCI Express (x8 mechanically, x4 electrically)
Flash ROM	Yes
HD Integrated Audio	High Definition Integrated Realtek ALC262 Audio with Line in, Line Out, Microphone, Headphone
CD-ROM ; analog audio cable	No
AUX ; analog audio in	Yes
Clear CMOS Button	Yes
CPU Fan Headers	One for each CPU socket
Chassis Fan Headers	2 Rear System Chassis Fan Header 1 Optional Front Chassis Fan Header
Chassis Speaker Header	Yes (Integrated in Front Control Panel Cable)
Front Control Panel/Speaker Header	Yes
CMOS Battery Holder - Lithium	Yes
Hood Lock Header	Yes
Hood Sensor Header	Yes Integrated in Front Control Panel Cable
Multibay Header	No
Integrated Gigabit Ethernet	Integrated Broadcom 5755 Gigabit Ethernet LoM
Wake on LAN	Yes
ASF 1.0/2.0 (Alert Standard Format)	Yes
TPM	Integrated
Integrated SATA RAID	<ul style="list-style-type: none"> <li>RAID 0, RAID 1*, RAID 5</li> <li>Supports one RAID array with 2-3 drives</li> <li>RAID 0 configuration - striped array (supported and configure to order)</li> <li>RAID 1 configuration - mirrored array (supported and configure to order)</li> <li>RAID 5 parity striping (supported but not configure to order)</li> </ul> <p><b>NOTE:</b> HW RAID functionality not supported by Linux. Use SW RAID functionality provided in the Red Hat Operating system instead.</p>
SATA Connectors	6 ports/connectors (Include 2 are eSATA configurable with optional eSATA After-Market Option cable kit)

## Technical Specifications

IEEE 1394a or 1394b	No integrated 1394a or 1394b - optional PCI card required. Cable from Front IO can be plugged into PCI Card. Not supported in Linux	
USB 2.0 Connectors	8 (5 rear, 2 on header for front, 1 internal)	
Power Supply Headers	Yes	
Power Switch, Power LED & Hard Drive LED Header	Yes	
Password Clear Header	Yes	
Power Supply	650 watt custom power supply (Wide Ranging, Active PFC)	
Operating Voltage Range	90 – 269 VAC	
Rated Voltage Range	100 – 240 VAC	118 VAC
Rated Line Frequency	50/60Hz	400Hz
Operating Line Frequency Range	47–66Hz	393–407 Hz
Rated Input Current	10 A @ 100-127VAC 6 A @ 200-240 VAC	10 A @ 118 VAC
Heat Dissipation (configuration and software dependent)	Typical = 434 btu/hr (109 kg-cal/hr) Maximum = 964 btu/hr (243 kg-cal/hr)	
Power Supply Fan	92x25 mm variable speed	
Energy Star Compliant (Config dependent)	YES	
80 PLUS® Compliant	YES	
FEMP Standby Power Compliant @115V (<2W in S5 – Power Off)	YES	
Power Consumption in ES Mode – Suspend to RAM (S3) (Instantly Available PC)	<5W	
Surge Tolerant Full Ranging Power Supply	Withstands power surges up to 2000V	
BIOS Features		
PCI 3.0 Support	Full BIOS support for PCI Express through industry standard interfaces.	
ASF 2.0 Compliant	Allows workstation status to be monitored on a remote console.	
WMI Support	WMI is Microsoft's implementation of Web-Based Enterprise Management (WBEM) for Windows. WMI is fully compliant with the Distributed Management Task Force (DMTF) Common Information Model (CIM) and WBEM specifications.	
BIOS Boot Spec 1.01 +	Provides more control over how and from what devices the workstation will boot.	
BIOS Power on	Users can define a specific date and time for the system to power on.	
Instantly Available PC (Suspend to RAM - ACPI sleep state S3)	Allows for very low power consumption with quick resume time	
ROM Based Computer Setup Utility (F10)	Review and customize system configuration settings controlled by the BIOS.	

## Technical Specifications

Remote System Installation via F12 (PXE 2.1) (Remote Boot from Server)	Allows a new or existing system to boot over the network and download software, including the operating system
System/Emergency ROM Flash Recovery with Video	Recovers corrupted system BIOS
Serial, Parallel, USB, Audio, Network, Enable/Disable Port Control	Enable or disables serial, parallel, USB, audio, and network ports
Removable Media Write Control/ Boot Control	User can prevent the workstation from writing to or booting from removable media
Power-On Password	Prevents an unauthorized person from booting up the computer
Setup Password	Prevents an unauthorized person from changing the system configuration
Replicated Setup	Saves BIOS settings to diskette or USB flash device in human readable file. Repset.exe utility can then replicate these settings on machines being deployed without entering Computer Setup Utility (F10)
Memory Change Alert (Requires HP Client Manager Software)	Alerts management console if memory is removed or changed
Thermal Alert (Requires HP Client Manager Software)	Monitors the temperature state within the chassis. Three modes: <ul style="list-style-type: none"> <li>● NORMAL - normal temperature ranges</li> <li>● ALERTED - excessive temperatures are detected. Raises a flag so action can be taken to avoid shutdown or provide for a smoother system shutdown</li> <li>● SHUTDOWN - excessive temperatures are encountered. Automatically shuts down the computer without warning before hardware component damage occurs</li> </ul>
Remote ROM Flash	Provides secure, fail-safe ROM image management from a central network console
Remote Wakeup	<ul style="list-style-type: none"> <li>● System administrators can power on, restart, and power off a client computer from a remote location.</li> </ul>
ACPI (Advanced Configuration and Power Management Interface)	<ul style="list-style-type: none"> <li>● Allows the system to enter and resume from low power modes (sleep states)</li> <li>● Controls system power consumption, making it possible to place individual cards and peripherals in a low-power or powered-off state without affecting other elements of the system</li> <li>● Supports ACPI 2.0 for full compatibility with 64-bit operating systems</li> </ul>
SMBIOS	System Management BIOS 2.5, previously known as DMI BIOS, for system management information
ROM revision levels	Identifies system ROM revision levels and reports in Computer Setup Utility (F10). Version is stored in an industry standard memory location (SMBIOS) so that management SW applications can use and report this information
System board revision level	<ul style="list-style-type: none"> <li>● Allows management SW to read revision level of the system board</li> <li>● Revision level is digitally encoded into the HW and cannot be modified</li> </ul>
Ownership Tag	A user-defined string stored in non-volatile memory that is displayed in the BIOS splash screen
Remote ROM Flash	Provides secure, fail-safe ROM image management from a central network console
Remote Wakeup/ Remote Shutdown	<ul style="list-style-type: none"> <li>● System administrators can power on, restart, and power off a client computer from a remote location.</li> <li>● Enables cost-effective power consumption when the administrator needs to distribute software, perform security management, or update the ROM.</li> </ul>
ROM Based Setup (F10) and Start-up Diagnostics	Yes
System Recovery	To recover the corrupted H/D data from the recovery partition (F11)

## Technical Specifications

Industry Standard	Revision Supported by the BIOS
ACPI	Advanced Configuration and Power Management Interface, Version 2.0
ASF	Alert Standard Format Specification, Version 2.0
ATA (IDE)	AT Attachment 6 with Packet Interface (ATA/ATAPI-6), Revision 3b
ATAPI	ATAPI Removable Media Device BIOS Specification Version 1.0
BBS	BIOS Boot Specification v1.01
BIOS 32-Bit Services	Standard BIOS 32-Bit Service Directory Proposal
CD Boot	"El Torrito" Bootable CD-ROM Format Specification Version 1.0
EDD	<ul style="list-style-type: none"> <li>Enhanced Disk Drive Specification Version 1.1</li> <li>BIOS Enhanced Disk Drive Specification Version 3.0</li> </ul>
EHCI	Enhanced Host Controller Interface for Universal Serial Bus, Revision 1.0
PCI	<ul style="list-style-type: none"> <li>PCI Local Bus Specification, Revision 2.3</li> <li>PCI Power Management Specification, Revision 1.1</li> <li>PCI Firmware Specification, Revision 3.0, Draft .7</li> </ul>
PCI Express	PCI Express Base Specification, Revision 1.0a
PMM	POST Memory Manager Specification, Version 1.01
SATA	<ul style="list-style-type: none"> <li>Serial ATA Specification, Revision 1.0a</li> <li>Serial ATA 3 Gb/s: Extensions to Serial ATA 1.5 Gb/s, Revision 1.0</li> <li>eSATA up to 3.0 Gb/s</li> </ul>
SMBIOS	System Management BIOS Reference Specification, Version 2.5
SPD	PC SDRAM Serial Presence Detect (SPD) Specification, Revision 1.2B
TPM	Trusted Computing Group TPM Specification Version 1.2
UHCI	Universal Host Controller Interface Design Guide, Revision 1.1
USB 1.1	Universal Serial Bus Revision 1.1 Specification
USB 2.0	Universal Serial Bus Revision 2.0 Specification

## System Software Updating

Product Change Notification	<ul style="list-style-type: none"> <li>Program to proactively communicate Product Change Notifications (PCNs) and Customer Advisories by email to customers, based on a user-defined profile.</li> <li>PCNs provide advance notification of hardware and software changes to be implemented in the factory providing time to plan for transition.</li> <li>Customer Advisories provide concise, effective problem resolution, greatly reducing the need to call technical support.</li> </ul>
Remote ROM Flash	Provides secure, fail-safe ROM image management from a central network console
Remote Wakeup/ Remote Shutdown	<ul style="list-style-type: none"> <li>System administrators can power on, restart, and power off a client computer from a remote location.</li> <li>Enables cost-effective power consumption when the administrator needs to distribute software, perform security management, or update the ROM.</li> </ul>
ROM Based Setup (F10) and Start-up Diagnostics	Yes
Support Software CD & WWW	Yes

## Other Deployment & Management Features

HP Client Management Solutions	Visit: <a href="http://www.hp.com/go/easydeploy">http://www.hp.com/go/easydeploy</a>
--------------------------------	--



## Technical Specifications

Serviceability Features of System	
Access panel	Tool-less, one-handed
Optical drives	Tool-less
Floppy drive	Tool-less
Hard drives	Tool-less
Expansion cards	Tool-less
Chassis fan removal	Tool-less
Green user touch points	Yes, on tool-free internal chassis mechanisms
Color-coordinated cables and connectors	Yes
Memory	Tool-less
CPUs	Requires T15 Torx driver, can be upgraded without removing any internal components except processor heat sink.
Power supply diagnostic LED	Yes, dual function: AC OK & power OK
Power Button	Yes, ACPI multi-function
Power LED	Yes, dual color LED indicates normal operation and faults.
Hard drive activity LED	Yes
Internal speaker	Yes, used for pre-boot diagnostic beep codes
Dual Color Power and HD LED on Front of Computer (Indicates Normal Operations and Fault Conditions)	green – normal red – fault
System/Emergency ROM Flash Recovery with Video	Recovers corrupted system BIOS.
Configuration Record SW	Yes
Over-Temp Warning on Screen (Requires IM Agents)	Yes
OS CD (Restore OS CD)	Restores computer to its original factory shipping image; No recovery CDs will ship with Windows XP, Vista or Linux - an ISO image will be available on an HD partition.
Restore CD	Restores the computer to its original factory shipping image - Can be obtained via HP Support
Processor ZIF Socket for easy Upgrade	Yes
ASF 2.0 support (Alert Standard Format)	Industry-standard specification for network alerting in operating system-absent environments
Dual function front power switch	Also acts as a reset switch when held for 4 seconds

## Technical Specifications

<b>Cooling Solutions</b>	
Power Supply Fan	92 mm x 92 mm x 25 mm variable speed
Processor Heatsink Fan(s)	80 mm x 80 mm x 15 mm 4-wire high frequency PWM
Rear Chassis Fan(s)	Two 92 mm x 92 mm x 25 mm 4-wire high frequency PWM
Memory Fan	92 mm x 92 mm x 25 mm 4-wire high frequency PWM
MCH Heatsink Fan	40 mm x 40 mm x 20 mm 4-wire high frequency PWM
Optional) Front PCI Fan	92 mm x 92 mm x 25 mm 4-wire high frequency PWM
<b>Security Features</b>	
112 Trusted Platform Module Chip with optional ProtectTools Software	Yes
Access Panel Key Lock (standard)	Prevents removal of the access panel and all internal components including optical and floppy drives
Padlock (optional)	Prevents entire system theft and discourages access panel removal. 7mm diameter padlock loop at rear of system.
Kensington Cable Lock (optional)	May prevent entire system theft; Kensington locks to tether systems to the desk. 3mm x 7mm slot at rear of system.
HP Solenoid Hood Lock/Sensor Kit (optional)	The Solenoid Hood Lock eliminates the need for a physical key by making the chassis lockable through software and a password. You can also lock and unlock the chassis remotely over the network. The Sensor Kit detects when the access panel has been removed.
Universal chassis clamp lock (optional)	The version without a cable discourages access panel removal and prevents theft of IO devices. The version with a cable additionally prevents entire system theft and allows multiple systems to be secured with a single cable.
<b>Service and Support</b>	
	On-site Warranty and Service (Note 1): This three-year, limited warranty and service offering delivers three years of on-site, next business-day (Note 2) service for parts and labor and includes free telephone support (Note 3) 24 x 7. Global coverage (Note 2) ensures that any product purchased in one country and transferred to another, non-restricted country will remain fully covered under the original warranty and service offering.
	<b>NOTE 1:</b> Terms and conditions may vary by country. Certain restrictions and exclusions apply.
	<b>NOTE 2:</b> On-site service may be provided pursuant to a service contract between HP and an authorized HP third-party provider, and is not available in certain countries. Global service response times are based on commercially reasonable best effort and may vary by country.
	<b>NOTE 3:</b> Technical telephone support applies only to HP-configured, HP and HP-qualified, third-party hardware and software. Toll-free calling and 24 x 7 support may not be available in some countries.

## Technical Specifications

Eco-Label Certifications & Declarations	This product has received or is in the process of being certified to the following approvals and may be labeled with one or more of these marks: <ul style="list-style-type: none"><li>● ENERGY STAR 4.0 (Configuration dependent, Microsoft Windows only)</li><li>● US Federal Energy Management Program (FEMP)</li><li>● China Energy Conservation Program</li><li>● IT ECO declaration</li><li>● Japan PC Green label*</li></ul> <p>* This product conforms to the examination standards (2003 version) under JEITA's 'PC Green Label System.'</p>						
Energy Consumption							
Example Configuration #1 Lightly Configured	Processor Info	1x Intel Xeon 1.86GHz, Dual Core, 5430					
	Memory Info	2x567MB DR 667MHz					
	Graphics Info	1xNVS290					
	Disks/Optical/Floppy	1x80GB 15k SAS / 2 Optical / 1 Floppy					
	PSU	650W 80Plus®					
Energy Consumption		115 VAC		230 VAC		100 VAC	
		LAN Enabled	LAN Disabled	LAN Enabled	LAN Disabled	LAN Enabled	LAN Disabled
	Windows Idle (S0)	102.4W		100W		100.3W	
	Windows Busy Typ(S0)	142.2W		139.3W		142.6W	
	Windows Busy Max (S0)	145.2W		144.9W		146.5W	
	Sleep (S3)	2.4W	2.9W	3.5W	3.2W	3.1W	2.8W
	Off (S5)	2.1W	1.8W	2.4W	2.1W	2W	1.36W
Heat Dissipation**		115 VAC		230 VAC		100 VAC	
		LAN Enabled	LAN Disabled	LAN Enabled	LAN Disabled	LAN Enabled	LAN Disabled
	Windows Idle (S0)	349.6 btu/hr		341.3 btu/hr		342.3 btu/hr	
	Windows Busy Typ(S0)	485.3 btu/hr		475.4 btu/hr		486.7 btu/hr	
	Windows Busy Max (S0)	495.6 btu/hr		494.6 btu/hr		500 btu/hr	
	Sleep (S3)	8.3 btu/hr	9.7 btu/hr	11.8 btu/hr	10.9 btu/hr	10.6 btu/hr	9.4 btu/hr
	Off (S5)	7.2 btu/hr	6 btu/hr	8.2 btu/hr	7.3 btu/hr	6.9 btu/hr	6 btu/hr

## Technical Specifications

Example Configuration #2 (Energy Star Compliant)	Processor Info	2x Intel Xeon 2.66GHz, Quad Core 5430					
	Memory Info	2x1GB DR 667MHz					
	Graphics Info	1xFX570					
	Disks/Optical/Floppy	1x500GB 15k SAS / 2 Optical / 1 Floppy					
	PSU	650W 80Plus®					
Energy Consumption		115 VAC		230 VAC		100 VAC	
		LAN Enabled	LAN Disabled	LAN Enabled	LAN Disabled	LAN Enabled	LAN Disabled
	Windows Idle (S0)	127.1W		124.6W		126.5W	
	Windows Busy Typ(S0)	261.8W		249.5W		263W	
	Windows Busy Max (S0)	282.5W		281W		282.5W	
	Sleep (S3)	3W	2.8W	3.4W	3.1W	3W	2.8W
	Off (S5)	2.1W	1.8W	2.4W	2.1W	2W	1.7W
Heat Dissipation**		115 VAC		230 VAC		100 VAC	
		LAN Enabled	LAN Disabled	LAN Enabled	LAN Disabled	LAN Enabled	LAN Disabled
	Windows Idle (S0)	433.8 btu/hr		425.4 btu/hr		431.6 btu/hr	
	Windows Busy Typ(S0)	893.5 btu/hr		851.5 btu/hr		897.6 btu/hr	
	Windows Busy Max (S0)	964.2 btu/hr		959.1 btu/hr		964.2 btu/hr	
	Sleep (S3)	10.3 btu/hr	9.4 btu/hr	11.7 btu/hr	10.6 btu/hr	10.3 btu/hr	9.4 btu/hr
	Off (S5)	7 btu/hr	6 btu/hr	8.3 btu/hr	7.2 btu/hr	6.9 btu/hr	5.9 btu/hr

Example Configuration #3 Heavily Configured	Processor Info	2x Intel Xeon 2.83GHz, Quad Core, 5440					
	Memory Info	8x1GB DR 667MHz					
	Graphics Info	1xFX4600					
	Disks/Optical/Floppy	1x500GB 15k SAS / 2 Optical / 1 Floppy					
	PSU	650W 80Plus®					
Energy Consumption		115 VAC		230 VAC		100 VAC	
		LAN Enabled	LAN Disabled	LAN Enabled	LAN Disabled	LAN Enabled	LAN Disabled
	Windows Idle (S0)	221.3W		221.6W		222.5W	
	Windows Busy Typ(S0)	424.6W		415.2W		428.6W	
	Windows Busy Max (S0)	449.9W		437.5W		454.8W	
	Sleep (S3)	4.1W	3.8W	4.9W	4.1W	4.4W	3.7W
	Off (S5)	2W	1.8W	2.4W	2.1W	2W	1.8W
Heat Dissipation**		115 VAC		230 VAC		100 VAC	
		LAN Enabled	LAN Disabled	LAN Enabled	LAN Disabled	LAN Enabled	LAN Disabled
	Windows Idle (S0)	755.1 btu/hr		756.3 btu/hr		759.4 btu/hr	
	Windows Busy Typ(S0)	1449.2 btu/hr		1417.1 btu/hr		1462.8 btu/hr	
	Windows Busy Max (S0)	1535.5 btu/hr		1493.2 btu/hr		1552.2 btu/hr	
	Sleep (S3)	13.9 btu/hr	12.8 btu/hr	16.7 btu/hr	14.1 btu/hr	15.1 btu/hr	12.7 btu/hr
	Off (S5)	7 btu/hr	6.1 btu/hr	8.2 btu/hr	7.3 btu/hr	6.8 btu/hr	6 btu/hr

## Technical Specifications

Declared Noise Emissions (High and entry level configurations)			
<b>System Configuration</b> (Entry-level)	<b>Processor Info</b> <b>Disks/Optical/Floppy</b>	Dual Intel Xeon E5410 2.33Ghz processors/ 2x 160GB 7200 rpm SATA / 1 DVD-ROM/ 1 Floppy	
<b>Declared Noise Emissions</b> (in accordance with ISO 7779 and ISO 9296)		<b>Sound Power</b> (LWad, bels)	<b>Deskside Sound Pressure</b> (LpAm, decibels)
	Idle	4.1 Bels	24 dB
	SATA Hard drive Operating (random reads)	4.2 Bels	25 dB
	Floppy Drive Operating (continuous copy)	4.8 Bels	33 dB
	DVD-ROM Operating (sequential reads)	5.1 Bels	36 dB
<b>System Configuration</b> (High-end)	<b>Processor Info</b> <b>Graphics Info</b> <b>Disks/Optical/Floppy</b>	Dual Intel Xeon E5450 3.0Ghz processors/ nVidia FX4600/ 2x146GB 15k SAS/ 1 DVD-ROM/ 1 Floppy	
<b>Declared Noise Emissions</b> (in accordance with ISO 7779 and ISO 9296)		<b>Sound Power</b> (LWad, bels)	<b>Deskside Sound Pressure</b> (LpAm, decibels)
	Idle	4.7 Bels	29 dB
	SATA Hard drive Operating (random reads - 80 reads/sec)	4.9 Bels	31 dB
	Floppy Drive Operating (continuous copy)	5.1 Bels	36 dB
	DVD-ROM Operating (sequential reads)	5.3 Bels	27dB

<b>Longevity and Upgrading</b>	<p>This product is designed to be upgraded, possibly extending its useful life by several years. Spare parts are available throughout the warranty period and for up to 5 years after the end of production. Upgradeability features contained in the product include:</p> <ul style="list-style-type: none"> <li>• Intel LGA771 processor socket</li> <li>• 8 USB ports (5 rear, 2 front, 1 internal)</li> <li>• 2 PCI slots and 4 PCI Express slots</li> <li>• 5/6 storage bays (2 - 3.5 inch OR 3 - 2.5" internal, 1 - 3.5 inch FDD, 2 - 5.25 inch removeable)</li> <li>• 8 memory slots</li> </ul>
--------------------------------	--

## Technical Specifications

<b>Batteries</b>	<p>This product complies with ISO standards:</p> <ul style="list-style-type: none"> <li>• EU Directive 91/ 157/ EEC</li> <li>• EU Directive 93/ 86/ EEC</li> <li>• EU Directive 98/ 101/ EEC</li> </ul> <p>Batteries used in the product do not contain:</p> <ul style="list-style-type: none"> <li>• Mercury greater the 5ppm by weight</li> <li>• Cadmium greater than 10ppm by weight</li> <li>• Lead greater than 4000ppm by weight.</li> </ul> <p>Battery size: CR2032 (coin cell) Battery type: Lithium</p>
------------------	---

<b>Additional Information</b>	<ul style="list-style-type: none"> <li>• This product is in compliance with the Restrictions of Hazardous Substances (RoHS) directive – 2002/95/EC.</li> <li>• This HP product is designed to comply with the Waste Electrical and Electronic Equipment (WEEE) Directive – 2002/96/EC.</li> <li>• Plastics parts weighing over 25 grams used in the product are marked per ISO 11469 and ISO1043.</li> <li>• This product contains 0% recycled materials (by wt.)</li> <li>• This product is &gt;90% recycle-able when properly disposed of at end of life.</li> </ul>
<b>Packaging Materials</b>	
External	Cardboard carton and insert 2.70 kg
Internal	LDPE Foam 0.35 kg

<b>Material Usage</b>	<p>This product does not contain any of the following substances in excess of regulatory limits (refer to the HP General Specification for the Environment at <a href="http://www.hp.com/hpinfo/globalcitizenship/environment/supplychain/gen_specifications.html">http://www.hp.com/hpinfo/globalcitizenship/environment/supplychain/gen_specifications.html</a>):</p> <ul style="list-style-type: none"> <li>• Asbestos</li> <li>• Certain Azo Colorants</li> <li>• Certain Brominated Flame Retardants – (No brominated flame retardants may be used as flame retardants in external plastic case parts)</li> <li>• Cadmium</li> <li>• Chlorinated Hydrocarbons</li> <li>• Chlorinated Paraffins</li> <li>• Formaldehyde</li> <li>• Halogenated Diphenyl Methanes</li> <li>• Hexavalent Chromium and its compounds</li> <li>• Lead carbonates and sulfates</li> <li>• Lead and Lead compounds</li> <li>• Lead in paint</li> <li>• Mercuric Oxide Batteries</li> <li>• Mercury and its compounds</li> <li>• Nickel - finishes must not be used on the external surface designed to be frequently handled or carried by the user.</li> <li>• Ozone Depleting Substances</li> <li>• Polybrominated Biphenyls (PBBs)</li> </ul>
-----------------------	--

## Technical Specifications

- Polybrominated Diphenyl Ethers (PBDEs)
- Polybrominated Biphenyl Oxides (PBBOs)
- Polychlorinated Biphenyl (PCB)
- Polychlorinated Terphenyls (PCT)
- Polyvinyl Chloride (PVC) – except for wires and cables, and certain retail packaging has been voluntarily removed from most applications.
- Radioactive Substances

### Packaging

HP follows these guidelines to decrease the environmental impact of product packaging:

- Eliminate the use of heavy metals such as lead, chromium, mercury and cadmium in packaging materials.
- Eliminate the use of ozone-depleting substances (ODS) in packaging materials.
- Design packaging materials for ease of disassembly.
- Maximize the use of post-consumer recycled content materials in packaging materials.
- Use readily recyclable packaging materials such as paper and corrugated materials.
- Reduce size and weight of packages to improve transportation fuel efficiency.
- Plastic packaging materials are marked according to ISO 11469 and DIN 6120 standards.

### End-Of-Life Management and Recycling

Hewlett-Packard offers end-of-life HP product return and recycling programs in many geographic areas. To recycle your product, please go to: <http://www.hp.com/recycle> or contact your nearest HP sales office. Products returned to HP will be recycled, recovered or disposed of in a responsible manner.

### Hewlett-Packard Corporate Environmental Information

For more information about HP's commitment to the environment:  
 [link to new HP white paper now in progress]  
 Global Citizenship Report  
<http://www.hp.com/hpinfo/globalcitizenship/gcreport/index.html>  
 Eco-label certifications  
<http://www.hp.com/hpinfo/globalcitizenship/environment/productdesign/ecolabels.html>  
 ISO 14001 certificates:  
<http://www.hp.com/hpinfo/globalcitizenship/environment/operations/envmanagement.html>

## Technical Specifications - Audio

High Definition Integrated Type	Integrated
Realtek ALC262 Audio	
High Definition Codec	Yes
SPDIF	No
External audio jacks	One front stereo analog microphone-in One front stereo headphone-out One rear line-in One rear line-out One rear stereo analog microphone-in
Internal audio connectors	AUX-IN line-level analog input
Retasking	<b>NOTE:</b> All external audio ports are retaskable as Line-In, Line-Out, Microphone-In, or Headphone-Out
Sampling	44.1 kHz/48 kHz/96kHz/192kHz (output only)
Wavetable syntheses (software)	Yes - Uses OS soft wavetable
Digital audio	Yes
Analog audio	Yes
Number of channels on Line-Out (mono/stereo)	Two independent stereo outputs (Left & Right channels)
Internal audio speaker power rating	1.5 W
Internal speaker	Yes
Microphone features	Stereo Microphone supporting: Acoustic echo cancellation Noise suppression Beam forming

HP Thin USB Powered Speakers (KK912AA)	On/Off/Volume Controls	Right side of right speaker
	Power LED	Front of right speaker (green)
	Frequency response	FO to 20kHz
	Watts	2/3 watt (normal/maximum)
	Dimensions (H x W x D)	Speakers: 5.72 x 3.74 x 0.96 in (14.52 x 9.50 x 2.45 cm) per speaker
	Net weight	0.68 lbs (0.31kg)
	Environmental (all conditions non-condensing)	<b>Temperature</b> (operating) 14° to 104° F (-10° to 40° C) <b>Relative Humidity</b> (operating) 40% to 90%
	Speaker cable length	Input cord: 5.91 ft (1800mm±35mm) L-channel cord: 3.28 ft (1000mm±35mm) USB cord: 5.91 ft (1800mm±35mm)
	Color	HP Carbonite
	Option kit contents	<ul style="list-style-type: none"> <li>One pair of HP Thin USB Powered Speakers with attached audio signal and USB power cables for connecting to your PC</li> <li>HP Warranty documentation</li> </ul>



## Technical Specifications - Audio

Sound Blaster X-Fi XtremeGamer Audio Card	Audio Quality	Total Harmonic Distortion + Noise at 1kHz (20kHz Low-pass filter) = 0.004%
	Signal to Noise Ratio (SNR)	Signal-to-Noise Ratio (20kHz Low-pass filter, A-Weighted) <ul style="list-style-type: none"> <li>• Stereo Output: 109dB</li> <li>• Front and Rear Channels: 109dB</li> <li>• Center, Subwoofer and Side Channels: 109dB</li> </ul>
	Sound Conversion	24-bit Analog-to-Digital conversion of analog inputs at 96kHz sample rate 24-bit Digital-to-Analog conversion of digital sources at 96kHz to analog 7.1 speaker output 24-bit Digital-to-Analog conversion of stereo digital sources at 192kHz to stereo output
	Recording/Sampling Rate	44.1, 48 and 96kHz
	ASIO 2.0 support	16-bit/44.1kHz, 16-bit/48kHz, 24-bit/44.1kHz 24-bit/48kHz and 24-bit/96kHz with direct monitoring
	Enhanced SoundFont support	up to 24-bit resolution 24-bit/96kHz
	DACs	24-bit/192kHz
	Voice Support	128 voices
	Max. Channels in 3D Positional Audio	7.1
	EAX® ADVANCED HD™ 5.0 support	Yes including EAX® MacroFX™, EAX® PurePath™ and Environment FlexiFX™
	Connectors	FlexiJack (Performing a 3-in-1 function, Digital In / Line In / Microphone) via 3.50 mm minijack Line level out (Front / Rear / Center / Subwoofer / Rear Center) via 3.50 mm minijacks AUX_IN line-level analog input via 4-pin Molex connector on card One AD_Link (26 pin) connector for linking to the X-Fi I/O Console (upgrade option)
	Dimensions	7.25 x 5 x 0.9 inches; 18.42 x 12.7 x 2.29 cm
	Additional product features	<div> <div>Movies</div> <div>THX Certification Dolby Digital EX 6.1 Playback DTS-ES 6.1 Playback</div> </div> <div> <div>Music</div> <div>X-Fi 24-bit Crystalizer CMSS-3D SuperRip</div> </div> <div> <div>Audio Creation</div> <div>Pristine audio playback quality with a near transparent SRC engine Up to eight 24 bit hardware effects ASIO recording with latency as low as one millisecond 24-bit SoundFont® sampling 3D MIDI</div> </div> <div> <div>Gaming</div> <div>EAX ADVANCED HD 5.0</div> </div> <div> <div>Software Bundle</div> <div>Doom 3 Sound Blaster EAX patch</div> </div>

Technical Specifications - Audio

		Entertainment Mode
		Audio Creation Mode
		Game Mode
		Mode Switcher
		Audio Console
		Creative MediaSource
		Creative MediaSource DVD-Audio Player
		DTS Neo:6 Settings
		Karaoke Player
		Entertainment Center
		Smart Recorder
		SoundFont Bank Manager
		Speaker Connection Wizard
		THX Setup Console
		Vienna SoundFont Studio
		Volume Panel
		WaveStudio
		Console Launcher
		Creative Media Toolbox
		Creative Diagnostics
Minimum System Requirements	System RAM	256 MB
	Hard Disk	600MB free space
		Available PCI 2.1 slot for the audio card
		CD-ROM/CD-RW or CD/DVD-ROM required for software installation
	Operating System	Microsoft Windows XP Professional Service Pack 2 (SP2), Microsoft Windows XP Professional x64, Microsoft Windows Vista Business 32 and 64
		Red Hat Linux WS 4 & 5

## Technical Specifications - Communications

Integrated PCI Express Broadcom BCM5755 NetXtreme Gigabit Ethernet Network Controller LoM	Connector	RJ-45
	Controller	Broadcom 5755 PCI-E LAN Controller
	Memory	Integrated 64KB receive buffer and 8KB transmit buffer
	Data rates supported	10/100/1000 Mbps
	Compliance	IEEE 802.3, 802.3AB and 802.3u compliant, 802.3x flow control
	Bus architecture	PCIe 1.0a
	Data path width	X1
	Data path speed	2.5Gbit per sec per direction transfer rate
	Data transfer mode	Bus-master DMA
	Power requirement	1.5 watts @ +3.3V AUX supply
	Boot ROM support	Yes
	Network transfer rate	10BASE-T (half-duplex) 10 Mbps
		10BASE-T (full-duplex) 20 Mbps
		100BASE-TX (half-duplex) 100 Mbps
		100BASE-TX (full-duplex) 200 Mbps
		1000BASE-T (full-duplex) 2000 Mbps
	Operating system driver support	Microsoft Windows Vista Business 32 and 64, Microsoft Windows XP Professional, Microsoft Windows XP Professional x64 Edition, Red Hat Enterprise Linux WS 4 & 5
	Management capabilities	WOL, PXE 2.1
	Alerting	ASF 2.0

Broadcom BCM5751 NetXtreme Gigabit Ethernet Controller (PCIe)	Connector	RJ-45
	Controller	Broadcom 5751 PCI-E 1.0a LAN Controller
	Memory	Integrated 96Kb frame buffer memory
	Data rates supported	10/100/1000 Mbps
	Compliance	IEEE 802.3, 802.3AB and 802.3u compliant, 802.3x flow control
	Bus architecture	PCI-E 1.0a
	Data path width	X1
	Data path speed	2.5Gbit per sec per direction transfer rate
	Data transfer mode	Bus-master DMA
	Hardware certifications	FCC class B, NRTL Mark Canada and United States, C-Tick for Australia, BSMI for Taiwan, VCCI for Japan, MIC for Korea, GOST for Russia
	Power requirement	3.1 watts @ +3.3V AUX supply
	Boot ROM support	Yes
	Network transfer rate	10BASE-T (half-duplex) 10 Mbps
		10BASE-T (full-duplex) 20 Mbps
		100BASE-TX (half-duplex) 100 Mbps
		100BASE-TX (full-duplex) 200 Mbps
		1000BASE-T, 1000 Mbps

Technical Specifications - Communications

Environmental	Operating temperature	32° to 131° F (0° to 55° C)
	Operating humidity	85% at 131° F (55° C)
Dimensions		4.4 x 2.2 x 0.08 inches; 11.2 x 5.5 x 0.2 cm
Operating system driver support		Microsoft Windows Vista Business 32 and 64, Microsoft Windows XP Professional, Microsoft Windows XP Professional x64, Red Hat Enterprise Linux 4 & 5
Management capabilities		WOL, PXE 2.1, Remote cable management
Alerting		ASF 2.0
Kit contents		Broadcom 5751, CD, Broadcom 5751 Netxtreme Gigabit PCIe NIC, drivers, quick install guide, product warranty statement

## Technical Specifications - Controllers

LSI SAS3041E Serial Attach SCSI (SAS) Host Bus Adapter (HBA)	PCI Bus	PCI-Express x4 lanes	
	PCI Modes	Bus Master DMA	
	PCI data burst transfer rate	1.0 GBps ( half duplex ) 2.0 GBps ( full duplex )	
	SAS Bandwidths	<b>Half Duplex</b> Single lane – 300 MBps Wide Port (2 lanes) – 600 MBps Wide Port (4 lanes) – 1200 MBps	<b>Full Duplex</b> Single SAS Lane – 600 MBps Wide Port (2 lanes) – 1200 MBps Wide Port (4 lanes) – 2400 MBps
	PCI Card Type	3.3 volt add-in card	
	PCI Voltage	12 V $\pm$ 10%	
	PCI Form Factor	6.6" x 2.731" (Low-profile)	
	PCI Power	7.5 Watts	
	Bracket	Full height and Low-profile	
	Certification Level	PCI-Express 1.0a	
	IO Bus	Four 3Gbps SAS / 1.5Gps SATA ports	
	SAS Processor	LSISAS1064E	
	Internal Connectors	Four- SATA x1 connectors	
	External Connectors	None	
	Max. Number of SCSI Devices	122	
	LED Indicators	On-board activity and fault LEDs	
	Integrated RAID Levels	RAID 0, 1, 1E and 10E	
	Integrated Mirroring	Integrated Mirroring option available	
	Environments	Operating	Storage
	Temperature	32° to 140° F (0° to 60° C)	-49° to +221° F (-45° to +105° C)
	Relative Humidity	5% to 90% non-condensing	5% to 90% non-condensing
	MTBF	>200,000 hours	
	Compliances	EMC: Class B-US (CFR 47, P15B); Canada (ICES-003); Japan (V-3/02.04);Europe (EN55022/EN55024); Australia/New Zealand (AS/NZS 3548); Safety: EN60950	
	Operating system support	Microsoft Windows Vista Business 32 and 64, Microsoft Windows XP Professional, XP Professional x64, Red Hat Enterprise Linux 4 & 5 Desktop	
	Kit contents	Controller card, driver CD, LED cables, user documentation and warranty card.	

## Technical Specifications - Controllers

LSI SAS MegaRAID® SAS 8888ELP Controller	PCI Bus	PCI-Express x8 lanes	
	PCI Modes	Bus Master DMA	
	PCI data burst transfer rate	Up to 3Gb/s per port	
	SAS Bandwidths	Up to 1.5 GB/s	
	PCI Voltage/Card Type	+3.3V Add-in Card	
	PCI Form Factor	7.71 x 2.54 in (19.59 x 6.44cm) (Low-profile, extended half-length)	
	PCI Power	7.5 Watts	
	Bracket	Low-profile, extended half-length	
	Certification Level	PCI-Express 1.0a	
	IO Bus	Eight 3Gb/s SAS/SATA ports	
	SAS Processor	LSI SAS1078	
	Internal Connectors	Two SAS SFF8088 x4	
	External Connectors	Two SAS SFF8087 x4	
	Max. Number of Physical Devices	32	
	LED Indicators	Connector LEDs indicate whether the internal or external connector is active for ports 0-3 and 4-7	
	RAID Levels	RAID 0, 1, and 5 RAID spans 10 and 50	
	Environments	Operating	Storage
	Temperature	32° to 122° F (0° to 50° C)	-49° to +221° F (-45° to +105° C)
	Relative Humidity	5% to 90% non-condensing	5% to 90% non-condensing
	MTBF	>200,000 hours	
	Compliances	EN55022, EN50082, EN60950; FCC Class A, Class B; UL1950; UL; CSA C22.2; VCCI; AS3548; BSMI; MIC	
	Operating system support	Microsoft® Windows® XP Professional, XP Professional 64-bit Genuine Windows Vista® Business 32-bit Genuine Windows Vista® Business 64-bit Red Hat Linux 7.2, 7.3, WS3 and WS4	
	Kit contents	Controller card, driver CD, LED cables, user documentation and warranty card.	

Technical Specifications - Hard Drives

Serial ATA Hard Drives	1 TB (7,200 rpm)	Capacity	1,000,204,886,016 bytes	
		Height	1 inches; 2.54 cm	
		Width	Media diameter: 3.5 inches; 8.89 cm Physical size: 4 inches; 10.2 cm	
		Interface	Serial ATA (3.0 Gb/s), Native Command Queuing enabled	
		Synchronous Transfer Rate (Maximum)	Up to 300 MB/s	
		Cache	32 MB	
		Seek Time (typical reads, includes controller overhead, including settling)	Single Track	2.0 ms
			Average	11 ms
			Full-Stroke	21 ms
		Rotational Speed	7,200 rpm	
		Logical Blocks	1,953,525,168	
		Operating Temperature	41° to 131°F (5° to 55°C)	
	500 GB (7,200 rpm)	Capacity	500,107,862,016 bytes	
		Height	1 inches; 2.54 cm	
		Width	Media diameter: 3.5 inches; 8.89 cm Physical size: 4 inches; 10.2 cm	
		Interface	Serial ATA (3.0 Gb/s), Native Command Queuing enabled	
		Synchronous Transfer Rate (Maximum)	Up to 300 MB/s	
		Cache	16 MB	
		Seek Time (typical reads, includes controller overhead, including settling)	Single Track	2 ms
			Average	11 ms
			Full-Stroke	21 ms
		Rotational Speed	7,200 rpm	
		Logical Blocks	976,773,168	
		Operating Temperature	41° to 131°F (5° to 55°C)	

## Technical Specifications - Hard Drives

250 GB (7,200 rpm)	Capacity	250,059,350,016 bytes	
	Height	1 inches; 2.54 cm	
	Width	Media diameter: 3.5 inches; 8.89 cm Physical size: 4 inches; 10.2 cm	
	Interface	Serial ATA (3.0 Gb/s) Native Command Queuing enabled	
	Synchronous Transfer Rate (Maximum)	Up to 300 MB/s	
	Cache	16 MB	
	Seek Time (typical reads, includes controller overhead, including settling)	Single Track	2 ms
		Average	11 ms
		Full-Stroke	21 ms
	Rotational Speed	7,200 rpm	
	Logical Blocks	488,397,168	
Operating Temperature	41° to 131°F (5° to 55°C)		
<hr/>			
160 GB (7,200 rpm)	Capacity	160,041,885,696 bytes	
	Height	1 inches; 2.54 cm	
	Width	Media diameter: 3.5 inches; 8.89 cm Physical size: 4 inches; 10.2 cm	
	Interface	Serial ATA (3.0 Gb/s), Native Command Queuing enabled	
	Synchronous Transfer Rate (Maximum)	Up to 300 MB/s	
	Cache	8 MB	
	Seek Time (typical reads, includes controller overhead, including settling)	Single Track	2 ms
		Average	11 ms
		Full-Stroke	21 ms
	Rotational Speed	7,200 rpm	
	Logical Blocks	312,581,808	
Operating Temperature	41° to 131°F (5° to 55°C)		



## Technical Specifications - Hard Drives

80 GB (7,200 rpm)	Capacity	80,026,361,856 bytes	
	Height	1 inches; 2.54 cm	
	Width	Media diameter: 3.5 inches; 8.89 cm Physical size: 4 inches; 10.2 cm	
	Interface	Serial ATA (3.0 Gb/s) Native Command Queuing enabled	
	Synchronous Transfer Rate (Maximum)	Up to 300 MB/s	
	Cache	8 MB	
	Seek Time (typical reads, includes controller overhead, including settling)	Single Track	2 ms
		Average	11 ms
		Full-Stroke	21 ms
	Rotational Speed	7,200 rpm	
	Logical Blocks	156,301,488	
	Operating Temperature	41° to 131°F (5° to 55°C)	

---

160 GB (10k rpm)	Capacity	160,041,885,696 bytes	
	Height	1 inches; 2.54 cm	
	Width	Media diameter: 3.5 inches; 8.89 cm Physical size: 4 inches; 10.2 cm	
	Interface	Serial ATA (1.5 Gb/s), Native Command Queuing enabled	
	Synchronous Transfer Rate (Maximum)	Up to 150 MB/s	
	Cache	16 Mbytes	
	Seek Time (typical reads, includes controller overhead, including settling)	Single Track	0.3 ms
		Average	4.6 ms
		Full-Stroke	10.2 ms
	Rotational Speed	10,000 rpm	
	Logical Blocks	312,581,808	
	Operating Temperature	41° to 131°F (5° to 55°C)	

---

## Technical Specifications - Hard Drives

80 GB (10k rpm)	<b>Capacity</b>	80,026,361,856 bytes	
	<b>Height</b>	1 inches; 2.54 cm	
	<b>Width</b>	Media diameter: 3.0 inches; 7.62 cm Physical size: 4 inches; 10.2 cm	
	<b>Interface</b>	Serial ATA (1.5 Gb/s), Native Command Queuing enabled	
	<b>Synchronous Transfer Rate (Maximum)</b>	Up to 150 MB/s	
	<b>Cache</b>	16 Mbytes	
	<b>Seek Time</b> (typical reads, includes controller overhead, including settling)	<b>Single Track</b>	0.3 ms
		<b>Average</b>	4.6 ms
		<b>Full-Stroke</b>	10.2 ms
	<b>Rotational Speed</b>	10,000 rpm	
	<b>Logical Blocks</b>	156,301,488	
	<b>Operating Temperature</b>	41° to 131°F (5° to 55°C)	

Serial Attached SCSI (SAS) Hard Drives	450 GB (15K rpm)	<b>Capacity</b>	450,098,159,616 bytes	
		<b>Height</b>	1.0 inches; 25.4mm	
		<b>Width</b>	4.0 inches; 101.6mm	
		<b>Interface</b>	SAS	
		<b>Synchronous Transfer Rate (Maximum)</b>	3.0 Gb/s	
		<b>Buffer</b>	16 MB	
		<b>Seek Time</b> (typical reads, includes controller overhead, including settling)	<b>Single Track</b>	0.2 ms
			<b>Average</b>	3.5 ms
			<b>Full-Stroke</b>	6.7 ms
		<b>Rotational Speed</b>	15,000 rpm	
		<b>Logical Blocks</b>	879,097,968- 512 byte blocks	
		<b>Operating Temperature</b>	50° to 95° F (10° to 35° C)	

	300 GB (15K rpm)	<b>Capacity</b>	300,000,000,000 bytes	
		<b>Height</b>	1.0 in (25.4mm)	
		<b>Width</b>	4.0 in (101.6mm)	
		<b>Interface</b>	SAS	
		<b>Synchronous Transfer Rate (Maximum)</b>	3.0 Gb/s	
		<b>Buffer</b>	16 MB	
		<b>Seek Time</b> (typical reads, includes controller overhead, including settling)	<b>Single Track</b>	0.2 ms
			<b>Average</b>	3.5 ms
			<b>Full-Stroke</b>	6.7 ms
		<b>Rotational Speed</b>	15,000 rpm	

Technical Specifications - Hard Drives

146 GB (15K rpm)	Logical Blocks	585,937,500 - 512 byte blocks	
	Operating Temperature	50° to 95° F (10° to 35° C)	
	Capacity	146,815,737,856 bytes	
	Height	1.0 in (25.4mm)	
	Width	4.0 in (101.6mm)	
	Interface	SAS	
	Synchronous Transfer Rate (Maximum)	3.0 Gb/s	
	Buffer	16 MB	
	Seek Time (typical reads, includes controller overhead, including settling)	Single Track	0.2 ms
		Average	3.5 ms
		Full-Stroke	6.7 ms
	Rotational Speed	15,000 rpm	
	Logical Blocks	286,749,488 - 512 byte blocks	
	Operating Temperature	50° to 95° F (10° to 35° C)	
73 GB (15K rpm)	Capacity	73,407,856,856 bytes	
	Height	1.0 in (2.54 cm)	
	Width	4.0 in (101.6mm)	
	Interface	SAS	
	Synchronous Transfer Rate (Maximum)	3.0 Gb/s	
	Buffer	16 MB	
	Seek Time (typical reads, includes controller overhead, including settling)	Single Track	0.2 ms
		Average	3.5 ms
		Full-Stroke	6.7 ms
	Rotational Speed	15,000 rpm	
	Logical Blocks	143,374,738 - 512 byte blocks	
	Operating Temperature	50° to 95° F (10° to 35° C)	

## Technical Specifications - Hard Drives

Serial Attached SCSI (SAS) 146 GB  
2.5" Small Form Factor (10K rpm)  
Hard Drives

Capacity	146,815,737,856 bytes
Height	0.583 in (14.8mm)
Width	2.76 in (70.0mm)
Interface	SAS
Synchronous Transfer Rate (Maximum)	1.5 GB
Buffer	16 MB
Seek Time (typical reads, includes controller overhead, including settling)	<b>Single Track</b> .4 ms <b>Average</b> <4.0 ms <b>Full-Stroke</b> <8.2ms
Rotational Speed	10,000 rpm
Logical Blocks	286,749,488 - 512 byte blocks
Operating Temperature	50° to 95° F (10° to 35° C)
Mean time between failures (MTBF)	1,600,000 hours

73 GB  
(10K rpm)

Capacity	73,407,865,856 bytes
Height	0.583 in (14.8mm)
Width	2.76 in (70.0mm)
Interface	SAS
Synchronous Transfer Rate (Maximum)	1.5 GB
Buffer	16 MB
Seek Time (typical reads, includes controller overhead, including settling)	<b>Single Track</b> 0.4 ms <b>Average</b> 4.0 ms <b>Full-Stroke</b> 8.2 ms
Rotational Speed	15,000 rpm
Logical Blocks	143,374,738 - 512 byte blocks
Operating Temperature	50° to 95° F (10° to 35° C)

## Technical Specifications - Input/Output Devices

HP IEEE 1394a FireWire 400 3-Port PCI Card	Device Interface Protocol	IEEE-1394a
	Data Rate	400 Mbps
	Devices Supported	IEEE-1394 compliant devices
	Bus Interface	PCI
	Physical	PCI card with brackets for low profile and full height PCI slots.
	Environmental	<b>Operating temperature</b> 50° to 131° F (10° to 55° C)
		<b>Non-operating temperature</b> -22° to 140° F (-30° to 60° C)
		<b>Relative humidity</b> 20% to 80%
	Ports	Two IEEE1394 6-Pin Connector (Rear)
	Minimum System Requirements	Microsoft Windows Vista Business 32 or 64, Microsoft Windows XP Professional, Windows XP Home, not supported on Linux Pentium II 266 or faster 128-MB RAM 1-GB Hard Drive CD-ROM drive Built in sound system Available PCI slot
	Regulatory Agency Approval	FCC Part 15B, cULus 60950, CE Mark EN55022B(1995)/EN55024-1998 STD, Taiwan BSMI CNS13438, Korea MIC

HP IEEE 1394b FireWire 800 3-Port PCI Card (Windows XP Only)	Device Interface Protocol	IEEE-1394
	Data Rate	800 Mbps
	Devices Supported	IEEE-1394 compliant devices
	Bus Interface	PCI
	Physical	PCI card with brackets for low profile and full height PCI slots.
	Environmental	<b>Operating temperature</b> 50° to 131° F (10° to 55° C)
		<b>Non-operating temperature</b> -22° to 140° F (-30° to 60° C)
		<b>Relative humidity</b> 20% to 80%
	Ports	Two IEEE-1394b bilingual 9-Pin Connector (Rear)
	Connectors	One 10-Pin header Custom Connector (Internal)
	Minimum System Requirements	Microsoft Windows XP Professional, Windows XP Home, not supported on Linux Pentium III 128-MB RAM 1-GB Hard Drive CD-ROM drive Built in sound system Available PCI slot

## Technical Specifications - Input/Output Devices

### Regulatory Agency Approval

FCC Part 15B, cULus 60950, CE Mark EN55022B(1995)/EN55024-1998 STD, Taiwan BSMI CNS13438, Korea MIC

PS/2 OR USB Standard Keyboard	Physical characteristics	Keys	104, 105, 106, 107, 109 layout (depending upon country)
		Dimensions (L x W x H)	18.0 x 6.4 x 0.98 inches; 45.8 x 16.3 x 2.5 cm
		Weight	2 lb (0.9 kg) minimum
	Electrical	Operating voltage	+ 5VDC $\pm$ 5%
		Power consumption	50-mA maximum (with three LEDs ON)
		ESD	CE level 4, 15-kV air discharge
		EMI - RFI	Conforms to FCC rules for a Class B computing device
	Mechanical	Microsoft PC 99 - 2001	Functionally compliant
		Languages	38 available
		Keycaps	Low-profile design
		Switch actuation	55-g nominal peak force with tactile feedback
		Switch life	20 million keystrokes (using Hasco modified tester)
		Switch type	Contamination-resistant switch membrane
		Key-leveling mechanisms	For all double-wide and greater-length keys
		Cable length	6 ft (1.8 m)
		Microsoft PC 99 - 2001	Mechanically compliant
	Environmental	Acoustics	43-dBA maximum sound pressure level
		Operating temperature	50° to 122° F (10° to 50° C)
		Non-operating temperature	-22° to 140° F (-30° to 60° C)
		Operating humidity	10% to 90% (non-condensing at ambient)
		Non-operating humidity	20% to 80% (non-condensing at ambient)
		Operating shock	40 g, six surfaces
		Non-operating shock	80 g, six surfaces
		Operating vibration	2-g peak acceleration
		Non-operating vibration	4-g peak acceleration
		Drop (out of box)	26 inches; 66 cm on carpet, six-drop sequence
		Drop (in box)	42 inches; 107 cm on concrete, 16-drop sequence
	Operating system support	Microsoft Windows Vista Business 32 or 64, Microsoft Windows XP Professional, Microsoft Windows XP Professional x64 Edition, Red Hat Enterprise Linux 4 & 5 Desktop	
	Approvals	UL, CSA, FCC, CE Mark, TUV, TUV GS, VCCI, BSMI, C-Tick, MIC	
	Ergonomic compliance	ANSI HFS 100, ISO 9241-4, and TUVGS	
	Kit contents	Keyboard, keyboard software media, installation guide, warranty card, safety and comfort	

## Technical Specifications - Input/Output Devices

HP USB Laser Mouse (GW405AA)	Dimensions (HxLxW)	1.53 x 4.6 x 2.44 in (39 x 117 x 62 mm)		
	Weight	3.33 oz (94g)		
	Cable length	6 feet (185 cm)		
	Tracking	Laser optics resolution	Typical	800 dpi
			Max	10 inches/sec (25 cm/sec)
	Environmental	Accuracy	± 15%	
		Orthogonality	± 10%	
		Hysteresis	± 10%	
		Backlash	± 2%	
		Operating temperature	32° to 104° F (0° to 40° C)	
	Power Rating	Non-operating temperature	-40° to 158° F (-40° to 70° C)	
		Operating humidity	10% to 90% (non condensing at ambient)	
		Supply Voltage	Min-4.25v, Typ-5.0v, Max-5.25v	
		Supply Current	Max-100mA	
	System requirements	Suspend Current	Max-0.5mA	
		Windows Vista Business 64*, Windows Vista Business 32*, Windows Vista Home Basic 32*, Windows 2000, Windows XP Professional or Windows XP Home 32* (No driver is required for this device. Native support is provided by the operating system.), xpe, ce.net, Linux, XP-64.		

\* Certain Windows Vista product features require advanced or additional hardware. Windows Vista Upgrade Advisor can help you determine which features of Windows Vista will run on your computer. To download the tool, visit: <http://www.windowsvista.com/upgradeadvisor>. For Windows Vista system requirements, visit: <http://www.windowsvista.com/systemrequirements>.

HP PS/2 Optical Scroll Mouse	Dimensions (H x L x W)	1.56 x 2.44 x 4.61 in (3.95 x 6.21 x 11.7 cm)		
	Weight	4.44 oz (126 g)		
	Environmental	Operating temperature	-32° to 104°F (0° to 40° C)	
		Non-operating temperature	-4° to 140°F (-20° to 60° C)	
		Operating humidity	10% to 90% (non-condensing at ambient)	
		Non-operating humidity	10% to 90% non-condensing	
		Operating shock	40 g, 6 surfaces	
		Non-operating shock	80 g, 6 surfaces	
		Operating vibration	2 g peak acceleration	
		Non-operating vibration	4 g peak acceleration	
		Drop (out-of-box)	80 cm height onto asphalt tile over concrete or equivalent, 5-drop in 5 direction except the cable face	
	Electrical	Operating voltage	5 VDC ± 10%	

## Technical Specifications - Input/Output Devices

Mechanical	Power consumption	100mA
	System consumption	PS/2 mini-din connector
	ESD	CE level 4, 15 kV air discharge
	EMI-RFI	Conforms to FCC rules for a Class B computing device
	Microsoft PC99 - 2001	Functionally compliant
	Resolution	400 ± 20% DPI
	Tracking speed	10 in/s (25.4 cm/s) maximum
	Acceleration	100 in/s/s (2.54 m/s/s)
	Switch actuation	61 g nominal peak force
	Switch life	3,000,000 operations (using Hasco modified tester)
Scroll wheel	Switch type	Low force micro-switches
	Tracking mechanism life	155 mi (250 km) at average speed of 10 in/s
	Cable length	6 ft (1.8 m)
	Microsoft PC99 - 2001	Mechanically compliant
	Width	8 mm
	Diameter	1.01 in (25.6 mm)
	Maximum rotation speed	48 rats/sec
	Switch type	Light force micro-switch
	Switch life	1 million operations
	Mechanical life	Minimum 200,000 revolutions
Regulatory approvals	Compliant	UL, CSA, FCC, CE Mark, TUV, TUV GS, VCCI, BSMI, C-Tick, MIC
Compatibility	Operating system support	Windows Vista Business 32 and 64*, Windows XP Professional, Windows XP Professional x64, Linux

\* Certain Windows Vista product features require advanced or additional hardware. Windows Vista Upgrade Advisor can help you determine which features of Windows Vista will run on your computer. To download the tool, visit <http://www.windowsvista.com/upgradeadvisor>. For Windows Vista system requirements, visit <http://www.windowsvista.com/systemrequirements>.

HP 2-button Optical Scroll Mouse (USB)	Dimensions (H x L x W)	1.5 x 4.5 x 2.5 inches; 3.8 x 11.6 x 6.3 cm
	Weight	0.27 lb (0.12 kg)
	Cable length	72.8 inches; 185 cm
	System requirements	Microsoft Windows Vista Business 32 or 64, Microsoft Windows XP Professional, Microsoft Windows XP Professional x64 Edition, Red Hat Enterprise Linux 4 & 5 Desktop



## Technical Specifications - Input/Output Devices

HP Optical 3-Button Mouse (USB)	Dimensions/Weight	Height	1.5 inches; 3.76 cm
		Length	4.5 inches; 11.56 cm
		Width	2.4 inches; 6.19 cm
	Environmental	Weight	3.80 oz (108 g)
		Operating temperature	32° to 104° F (0° to 40° C)
		Non-operating temperature	-4° to 140° F (-20° to 60° C)
	Mechanical	Operating humidity	10% to 90% (non condensing at ambient)
		Tracking speed	6 in/s Maximum
		Switch life	3,000,000 operations
		Switch type	Micro-switches
		Tracking mechanism life	155 miles (250 km) at average speed of 10 in/s
		Cable length	9.5 ft (2.9 m)
		System requirements	Microsoft Windows Vista Business 32 or 64, Microsoft Windows XP Professional, Microsoft Windows XP Professional x64 Edition, Red Hat Enterprise Linux 4 & 5 Desktop

HP SpacePilot 3D USB Intelligent Controller (model EF390AA)	Physical Characteristics	Dimensions (L x W x H)	9.3 x 5.6 x 2.0 inches; 236 x 143 x 53 mm
		Weight	1.875 lb (0.85 kg)
		Palmrest	Sculpted
	Mechanical	Buttons	21 + programmable speed keys 15 reprogrammable
		LCD Viewing Area	(W x H) 4.1 x 1.2 inches; 102 x 30 mm
		Active Area	(W x H) 3.9 x 1.0 inches; 98 x 26 mm
		Display Format	240 x 64
		Motion Controller	Six degrees of freedom motion control through the X, Y, Z axis (pitch, roll, yaw)
		Device Sensitivity	Adjustable to preference
	System Requirements	Intel Pentium 4 or AMD Athlon processor based system	
		20 megabytes free disk space for driver and plug-in installation (CD-ROM device required)	
		USB 1.1 or 2.0	
	Operating System Supported	Microsoft Windows XP Professional, Microsoft Windows XP Professional x64, Microsoft Windows Vista Business 32 and 64	
	Regulatory Approvals	FCC, CE	

Technical Specifications - Input/Output Devices

HP SpaceExplorer (USB - Windows Only)	Physical Characteristics	Dimensions (L x W x H)	7.6 x 5.4 x 2.3 in (194 x 139 x 58mm)
		Weight	1.36 lbs (0.62 kg)
		Palmrest	Sculpted
	Mechanical	Buttons	15 reprogrammable speed keys
		Motion Controller	Six degrees of freedom motion control through the X, Y, Z axis (pitch, roll, yaw)
		Device Sensitivity	Adjustable to preference
	System Requirements	USB 1.1 or 2.0	
	Operating System Supported	Microsoft Windows XP Professional, Microsoft Windows XP Professional x64, Microsoft Windows Vista Business 32 and 64, not supported on Linux	
	Regulatory Approvals	FCC, CE	

## Technical Specifications - Optical Devices

HP 16X Max SATA DVD-ROM Drive	Form Factor	5.25-inch, half-height, tray-load	
	Orientation	Either horizontal or vertical	
	Interface type	SATA/ATAPI	
	Disc capacity	Single layer: Up to 4.7 GB (6 times capacity of CD-ROM) Double layer: Up to 8.5 GB (12 times capacity of CD-ROM)	
	Dimensions (W x H x D)	5.9 x 1.7 x 8.0 in (15.0 x 4.4 x 20.3 cm)	
	Weight (max)	2.6 lb (1.2 kg)	
	Read speeds	DVD+R/-R/+RW/-RW/+R DL /-R DL	Up to 8X
		DVD-ROM	Up to 16X
		DVD-RAM	Up to 4X
		CD-ROM, CD-R	Up to 48X
		CD-RW	Up to 32X

### Removable Storage - Media Compatibility - DVD-ROM

Media	Read	Write
CD-ROM	Yes	No
CD-R	Yes	No
CD-RW	Yes	No
DVD-ROM	Yes	No
DVD-ROM DL	Yes	No
DVD-RAM	Yes	No
DVD+R	Yes	No
DVD+R DL	Yes	No
DVD+RW	Yes	No
DVD-R	Yes	No
DVD-RW	Yes	No
DVD-R DL	Yes	No
Access times (typical reads, including setting)	Random	DVD: < 140 ms (typical), CD: < 125 ms (typical)
	Full Stroke	DVD: < 250 ms (seek), CD: < 210 ms (seek)
	Cache Buffer	2 MB (minimum)
	Data Transfer Modes	ATA PIO mode 4 (16.7 MB/s); ATA Multi-word DMA mode 2 (16.7 MB/s); ATA UltraDMA Mode 3 (44.4 MB/s -default)
Power	Source	SATA DC power receptacle
	DC Power Requirement	5 VDC $\pm$ 5%-100 mV ripple p-p 12 VDC $\pm$ 5%-200 mV ripple p-p
	DC Current	5 VDC - <1000 mA typical, < 1600 mA maximum 12 VDC - < 600 mA typical, < 1400 mA maximum

## Technical Specifications - Optical Devices

<b>Environmental</b> (all conditions non-condensing)	<b>Temperature</b> (operating)	41° to 122° F (5° to 50° C)
	<b>Relative Humidity</b> (operating)	10% to 90%
	<b>Maximum Wet Bulb Temperature</b> (operating)	86° F (30° C)
<b>Operating Systems Supported</b>	Microsoft Windows Vista Business 32 or 64, Microsoft Windows XP Professional, Microsoft Windows XP Professional x64 Edition, Red Hat Enterprise Linux 4 & 5 Desktop	
	No driver is required for this device. Native support is provided by the operating system.	
<b>Option kit contents</b>	HP 16X Max SATA DVD-ROM Drive, Intervideo WinDVD and installation guide.	

<b>HP 16X Max SATA DVD+/-RW LightScribe Drive</b>	<b>Form Factor</b>	5.25-inch, half-height, tray-load
	<b>Orientation</b>	Either horizontal or vertical
	<b>Interface type</b>	SATA/ATAPI
	<b>Disc capacity</b>	8.5 GB DL or 4.7 GB standard
	<b>Dimensions</b> (W x H x D)	5.9 x 1.7 x 8.0 in (15.0 x 4.4 x 20.3 cm)
	<b>Weight</b> (max)	2.6 lb (1.2 kg)
	<b>Write speed</b>	<b>DVD+R</b> Up to 16X
		<b>DVD+RW</b> Up to 8X
		<b>DVD+R DL</b> Up to 8X
		<b>DVD-R DL</b> Up to 4X
		<b>DVD-R</b> Up to 16X
		<b>DVD-RW</b> Up to 6X
		<b>DVD-RAM</b> Up to 12X
		<b>CD-R</b> Up to 48X
		<b>CD-RW</b> Up to 32X
		<b>DVD-RAM</b> Up to 12X
	<b>Read speeds</b>	<b>DVD+RW, DVD-RW, DVD+R DL, DVD-R DL</b> Up to 8X
		<b>DVD-ROM, DVD+R, DVD-R</b> Up to 16X
		<b>CD-ROM, CD-R</b> Up to 48X
		<b>CD-RW</b> Up to 32X
		<b>Random</b> DVD: < 130 ms (typical), CD: < 120 ms (typical)
	<b>Access times</b> (typical reads, including setting)	<b>Full Stroke</b> DVD: < 240 ms (seek), CD: < 200 ms (seek)
	<b>Power</b>	<b>Source</b> SATA DC power receptacle
		<b>DC Power Requirement</b> 5 VDC $\pm$ 5%-100 mV ripple p-p 12 VDC $\pm$ 5%-200 mV ripple p-p

Technical Specifications - Optical Devices

	<b>DC Current</b>	5 VDC - < 1000 mA typical, < 1600 mA maximum 12 VDC - < 600 mA typical, < 1400 mA maximum
	<b>Total Drive Power</b> (standby mode)	< 2.5 Watt
	<b>Temperature</b> (operating)	41° to 122° F (5° to 50° C)
	<b>Relative Humidity</b> (operating)	10% to 90%
	<b>Maximum Wet Bulb Temperature</b> (operating)	86° F (30° C)
<b>Operating Systems Supported</b>	Microsoft Windows Vista Business 32 or 64, Microsoft Windows XP Professional, Microsoft Windows XP Professional x64 Edition, Red Hat Enterprise Linux 4 & 5 Desktop No driver is required for this device. Native support is provided by the operating system.	
	* Certain Windows Vista product features require advanced or additional hardware. Windows Vista Upgrade Advisor can help you determine which features of Windows Vista will run on your computer. To download the tool, visit <a href="http://www.windowsvista.com/upgradeadvisor">http://www.windowsvista.com/upgradeadvisor</a> . For Windows Vista system requirements, visit <a href="http://www.windowsvista.com/systemrequirements">http://www.windowsvista.com/systemrequirements</a> .	
<b>Option kit contents</b>	HP 16X DVD+-RW SuperMulti LightScribe drive, LightScribe software, Roxio Easy Media Creator version 9, Intervideo WinDVD Software, installation guide, and DVD+R media. Software is Microsoft Windows only.	

## Technical Specifications - Graphics

NVIDIA Quadro NVS 440 256 MB Graphics Controller	Form Factor	ATX
	Graphics Controller	2 nv43 2D graphics processor units (GPUs)
	VGA controller	Integrated into the Quadro GPU
	Bus Type	PCI-E x16
	RAMDAC	Dual 350 MHz
	Memory	256 MB DDR frame buffer and Texture storage (128MB per GPU)
	Connector	Two DMS-59
	Controller clock speed	250 MHz
	Color planes	32-bit color buffer
	Overlay planes	1 16-bit Video overlay plane
	Maximum pixel clock	350 MHz
	Multi-Monitor Support	Up to 4 analog or digital monitors
	Single DVI Support	Yes
	Dual DVI Support	Yes
	High-definition Video Processor (HDVP)	Full-screen, full-frame video playback of HDTV and DVD content DVD-ready motion compensation for MPEG-2 Independent hardware color controls for video overlay Hardware color-space conversion (YUV 4:2:2 and 4:2:0) IDCT motion compensation 5-tap horizontal by 3-tap vertical filtering 8:1 up/down scaling
Available graphics drivers		Microsoft Windows Vista Business 32 or 64, Microsoft Windows XP Professional, Microsoft Windows XP Professional x64 Edition, Linux - Full Open GL implementation, complete with NVIDIA and ARB extensions. HP qualified drivers may be preloaded or available from the HP support Web site: <a href="http://welcome.hp.com/country/us/eng/software_drivers.html">http://welcome.hp.com/country/us/eng/software_drivers.html</a> .

NVIDIA Quadro NVS 290, 256 MB Dual Head	Form Factor	Low Profile
	Bus Type	PCIe x16
	Memory	256 MB 400MHz DDR2 SDRAM unified frame buffer, Z-buffer and Texture storage
	Connector	DMS-59, includes DMS-59 to Dual DVI-I cable. DMS-59 to Dual VGA cable available as an option.
	Display resolution support	Dual integrated analog display controllers supporting up to two analog displays at 2048x1536 @ 85Hz on both displays or dual digital displays at 1920x1200 (single-link). NVIEW advanced multi-display desktop and application management seamlessly integrated into Microsoft® Windows®
	RAMDAC	Integrated dual 400MHz
	Color planes	32-bit color buffer
	Overlay planes	Hardware supported
	nView Architecture	Advanced multi-display desktop & application management seamlessly integrated into Microsoft Windows®.

## Technical Specifications - Graphics

<b>Multi-Monitor Support</b>	Dual monitor support
<b>DVI Support</b>	DMS-59 (to dual DVI-SL)
<b>High-definition Video Processor (HDVP)</b>	Full-screen, full-frame video playback of HDTV and DVD content DVD-ready motion compensation for MPEG-2 Independent hardware color controls for video overlay Hardware color-space conversion (YUV 4:2:2 and 4:2:0) IDCT motion compensation 5-tap horizontal by 3-tap vertical filtering 8:1 up/down scaling
<b>Supported Graphics APIs</b>	OpenGL 2.1 & DirectX Support; Shader Model 4.0
<b>Available graphics drivers</b>	Microsoft Windows Vista Business 32 and 64, Microsoft Windows XP (Provides full native Dual View mode, Span or Big Desktop mode, and Clone mode), Linux – Full Open GL implementation, complete with NVIDIA and ARB extensions. HP qualified drivers may be preloaded or available from the HP support Web site: <a href="http://welcome.hp.com/country/us/eng/software_drivers.html">http://welcome.hp.com/country/us/eng/software_drivers.html</a> .

NVIDIA Quadro FX 370 PCI-Express graphics controller	<b>Form Factor</b>	ATX
	<b>Bus Type</b>	PCI-Express x16
	<b>Memory</b>	256MB 400MHz DDR2 SDRAM unified frame buffer, Z-buffer and Texture storage
	<b>Connectors</b>	DVI-I (dual-link) and DVI-I (single-link)
	<b>Display resolution support</b>	Dual integrated analog display controllers supporting up to two analog displays at 2048x1536 @ 85Hz on both displays or dual digital displays at 1920x1200 (single-link) and 3840x2400 (dual-link). NVIEW advanced multi-display desktop and application management seamlessly integrated into Microsoft® Windows®
	<b>RAMDAC</b>	Integrated dual 400MHz
	<b>Architecture Features</b>	High Resolution Anti-Aliasing PureVideo 2 engine supports AES 128-bit decryption GPU Computing (HW/SW including CUDA SDK) 3D Textures LightSpeed Memory Architecture II 128-bit color precision Hardware accelerated anti-aliased points and lines Hardware OpenGL overlay planes H/W accelerated pixel readback 3rd generation occlusion culling AA on scan-out
	<b>Power consumption</b>	<50 W
	<b>Shading Architecture</b>	Fully programmable GPU (OpenGL 2.1/DirectX 10 class) Vertex/Pixel Shader 4.0 Shading Support (HLSL, GLSL, CgFX)
	<b>Supported Graphics APIs</b>	OpenGL 2.1 & SM4.0 and DirectX10 Support

## Technical Specifications - Graphics

**Available graphics drivers** Microsoft Windows Vista 32 and 64, Microsoft Windows XP, Linux – Full Open GL implementation, complete with NVIDIA and ARB extensions. HP qualified drivers may be preloaded or available from the HP support web site:  
[http://welcome.hp.com/country/us/eng/software\\_drivers.html](http://welcome.hp.com/country/us/eng/software_drivers.html).

NVIDIA Quadro FX 570 PCI-Express graphics controller	<b>Form Factor</b>	ATX
	<b>Bus Type</b>	PCI-Express x16
	<b>Memory</b>	256MB 400MHz DDR2 SDRAM unified frame buffer, Z-buffer and Texture storage
	<b>Connectors</b>	DVI-I (dual-link) and DVI-I (single-link)
	<b>Display resolution support</b>	Dual integrated analog display controllers supporting up to two analog displays at 2048x1536 @ 85Hz on both displays or dual digital displays at 1920x1200 (single-link) and 3840x2400 (dual-link). NVIEW advanced multi-display desktop and application management seamlessly integrated into Microsoft® Windows®
	<b>RAMDAC</b>	Integrated dual 400MHz
	<b>Architecture Features</b>	High Resolution Anti-Aliasing PureVideo 2 engine supports AES 128-bit decryption GPU Computing (HW/SW including CUDA SDK 3D Textures LightSpeed Memory Architecture II 128-bit color precision Hardware accelerated anti-aliased points and lines Hardware OpenGL overlay planes H/W accelerated pixel readback 3rd generation occlusion culling AA on scan-out
	<b>Power consumption</b>	<60 W
	<b>Shading Architecture</b>	Fully programmable GPU (OpenGL 2.1/DirectX 10 class) Vertex/Pixel Shader 4.0 Shading Support (HLSL, GLSL, CgFX)
	<b>Supported Graphics APIs</b>	OGL 2.1 & SM4.0 and DirectX10 Support
	<b>Available graphics drivers</b>	Microsoft Windows Vista 32 and 64, Microsoft Windows XP, Linux - Full Open GL implementation, complete with NVIDIA and ARB extensions. HP qualified drivers may be preloaded or available from the HP support web site: <a href="http://welcome.hp.com/country/us/eng/software_drivers.html">http://welcome.hp.com/country/us/eng/software_drivers.html</a> .



## Technical Specifications - Graphics

NVIDIA Quadro FX 1700	Form Factor	ATX
PCI-Express graphics controller	Bus Type	PCI-Express x16
	Memory	512 MB 4000MHz DDR2 SDRAM unified frame buffer, Z-buffer and Texture storage
	Connectors	DVI-I (dual-link) and DVI-I (single-link)
	Display resolution support	Dual integrated analog display controllers supporting up to two analog displays at 2048x1536 @ 85Hz on both displays or dual digital displays at 1920x1200 (single-link) and 3840x2400 (dual-link). NVIEW advanced multi-display desktop and application management seamlessly integrated into Microsoft® Windows®
	RAMDAC	Integrated dual 400MHz
	Architecture Features	High Resolution Anti-Aliasing PureVideo 2 engine supports AES 128-bit decryption GPU Computing (HW/SW including CUDA SDK 3D Textures LightSpeed Memory Architecture II 128-bit color precision Hardware accelerated anti-aliased points and lines Hardware OpenGL overlay planes H/W accelerated pixel readback 3rd generation occlusion culling AA on scan-out
	Power consumption	<75 W
	Shading Architecture	Fully programmable GPU (OpenGL 2.1/DirectX 10 class) Vertex/Pixel Shader 4.0 Shading Support (HLSL, GLSL, CgFX)
	Supported Graphics APIs	OpenGL 2.1 & SM4.0 and DirectX10 Support
	Available graphics drivers	Microsoft Windows Vista 32 and 64, Microsoft Windows XP, Linux – Full Open GL implementation, complete with NVIDIA and ARB extensions. HP qualified drivers may be preloaded or available from the HP support web site: <a href="http://welcome.hp.com/country/us/eng/software_drivers.html">http://welcome.hp.com/country/us/eng/software_drivers.html</a> .

## Technical Specifications - Graphics

ATI FireGL V5600 PCI-Express graphics controller	Form factor	ATX
	Graphics controller	R520
	Bus Type	PCI-Express x16
	Memory	512 MB unified frame buffer, Z-buffer and Texture storage and a 128-bit Ring-Bus memory controller
	Connectors	Two dual-link DVI connectors with analog/digital outputs
	Maximum resolution	Dual Link digital support for 3840 x 2400 @ 60Hz. Ideal for 30-inch widescreen displays.
	RAMDAC	Dual 10-bit per channel 400MHz
	Ring Bus memory controller	<ul style="list-style-type: none"> <li>• 512-bit internal ring bus for highly efficient memory reads</li> <li>• Programmable intelligent arbitration logic</li> </ul>
	Display output	<ul style="list-style-type: none"> <li>• Up to 16-bit per RGB color component High Dynamic Range output (HDR)</li> <li>• Programmable piecewise linear gamma correction, color correction, and color space conversion (10-bits per color)</li> </ul>
	Shading architecture	<ul style="list-style-type: none"> <li>• Supports Full Shader Model 4.0</li> <li>• 120 shader processing unit</li> </ul>
	Supported graphics APIs	DirectX 10 and OpenGL 2.1 advanced
	Available graphics drivers	Microsoft Windows XP Professional qualified drivers may be preloaded or available from the HP support Web site: <a href="http://welcome.hp.com/country/us/eng/software_drivers.html">http://welcome.hp.com/country/us/eng/software_drivers.html</a> . HP-tested Windows XP and Linux Microsoft Windows Vista 32 and 64, Microsoft Windows XP, Linux - Full Open GL implementation, complete with NVIDIA and ARB extensions. HP qualified drivers may be preloaded or available from the HP support web site: <a href="http://welcome.hp.com/country/us/eng/software_drivers.html">http://welcome.hp.com/country/us/eng/software_drivers.html</a> .
	Option kit contents	PCA with ATX bracket, DVI to VGA converters, CD and manual.
NVIDIA Quadro FX 3700 Graphics Board	Form Factor	ATX
	Graphics Controller	NVIDIA NV71GL-U
	Bus Type	PCI Express x16
	Memory	512MB 700MHz GDDR3 SDRAM unified frame buffer, Z-buffer and Texture storage
	Connectors	2 dual-link DVI-I + 3-pin Mini DIN stereo output
	Display resolution support	Dual integrated analog display controllers supporting up to two analog displays at 2048x1536 @ 85Hz on both displays or dual digital displays at 2560x1600 @ 60Hz. NVIEW advanced multi-display desktop and application management seamlessly integrated into Microsoft® Windows®
	RAMDAC	Dual 400MHz integrated
	Architecture Features	256-bit memory interface 128-bit IEEE floating-point precision graphics pipeline 128-bit color precision 32x FSAA dramatically reduces visual aliasing artifacts at resolution up to 1920x1200 Hardware accelerated anti-aliased points and lines

## Technical Specifications - Graphics

	<ul style="list-style-type: none"> <li>Hardware OpenGL overlay planes</li> <li>Hardware accelerated two-sided lighting</li> <li>Hardware accelerated clipping planes</li> <li>3rd generation occlusion culling</li> <li>3D volumetric texture support</li> <li>Quad-buffered stereo</li> <li>Dual Link DVI enabling driving digital displays up to 2560x1600 @ 60Hz</li> <li>SLI Link</li> </ul>
<b>Shading Architecture</b>	<ul style="list-style-type: none"> <li>Fully programmable GPU (OpenGL 2.0/DirectX 9.0c class)</li> <li>Long fragment programs (unlimited instructions)</li> <li>Long vertex programs (unlimited instructions)</li> <li>Looping and subroutines (up to 256 loops per vertex program)</li> <li>Dynamic flow control</li> <li>Conditional execution</li> </ul>
<b>Supported Graphics APIs</b>	<ul style="list-style-type: none"> <li>OpenGL 2.1</li> <li>DirectX 10.0</li> </ul>
<b>Available Graphics Drivers</b>	<ul style="list-style-type: none"> <li>Genuine Windows Vista Business (64-bit and 32-bit)</li> <li>Microsoft Windows XP Professional (64-bit and 32-bit)</li> <li>Qualified drivers may be preloaded or available from the HP support Web site:</li> <li><a href="http://welcome.hp.com/country/us/eng/software_drivers.html">http://welcome.hp.com/country/us/eng/software_drivers.html</a>.</li> </ul>
<b>Maximum Resolution</b>	<ul style="list-style-type: none"> <li>Dual DVI-I output – drives dual digital displays at resolutions up to 2560x1600 @ 60Hz</li> <li>Internal 400MHz RAMDACs – drives dual analog displays up to 2048x1536 @ 85Hz each</li> </ul>

<b>NVIDIA Quadro FX 4600 (768 MB)</b>	<b>Graphics Controller</b>	NVIDIA Quadro FX 4600 Workstation GPU
	<b>Bus Type</b>	PCI Express x16
	<b>RAMDAC</b>	Dual 400 MHz integrated
	<b>Memory</b>	768 MB GDDR3 SDRAM unified graphics memory
	<b>Connectors</b>	2 Dual-Link DVI-I analog/digital monitor outputs, 1 3-pin Mini DIN stereo output, DVI-I to VGA adapters included
	<b>Multi-monitor Support</b>	Dual integrated display controllers supporting up to 2048x1536 @ 75Hz (analog) or 3840x2400 @ 41Hz (digital) on both displays
	<b>NVIDIA Quadro FX 4600 Architecture</b>	<ul style="list-style-type: none"> <li>384-bit memory interface</li> <li>67.2 GB/sec. memory bandwidth</li> <li>Full 128-bit floating point color precision</li> <li>12-bit subpixel precision</li> <li>65,536 fragment instruction</li> <li>65,536 vertex instruction</li> <li>3D volumetric textures</li> <li>Single-system powerwall</li> <li>Hardware accelerated antialiased points &amp; lines</li> <li>Hardware OpenGL® overlay planes</li> <li>Hardware accelerated two-sided lighting</li> <li>Hardware accelerated clipping planes</li> <li>Hardware two-sided lighting</li> <li>3rd-generation occlusion culling</li> </ul>

## Technical Specifications - Graphics

Shading Architecture	OpenGL quad-buffered stereo Hardware-Accelerated Pixel Read-Back
	16 textures per pixel in fragment programs Window ID clipping functionality Hardware accelerated line stippling Fully programmable GPU (OpenGL2.0/DirectX 9.0c class) Long fragment programs (up to 65,536 instructions) Long vertex programs (up to 65,536 instructions) Looping and subroutines (up to 256 loops per vertex program) Dynamic flow control Conditional execution
High Level Shader Languages	Optimized compiler for Cg and Microsoft® HLSL OpenGL 2.0 and DirectX 9.0c support Open source compiler
High-Resolution Antialiasing	12-bit subpixel sampling precision enhances AA quality Rotated-grid full-scene antialiasing (RG FSAA) 16x FSAA dramatically reduces visual aliasing artifacts or "jaggies" at resolution up to 1920x1200
Display Resolution Support	Dual Dual Link DVI-I output-drives digital displays at resolutions up to 3840 x 2400 @ 41Hz Internal 400 MHz DACs - Two analog displays up to 2048x1536 @ 75 Hz each
nView Architecture	Advanced multi-display desktop & application management seamlessly integrated into Microsoft Windows®.
Supported Graphics APIs	OpenGL 2.0 ICD with immediate mode support for all OGL primitive types DirectX 9.0c
Available Graphics drivers	Microsoft Windows XP Professional, Microsoft Windows Vista Professional, Linux - Full Open GL implementation, complete with NVIDIA and ARB extensions. HP qualified drivers may be preloaded or available from the HP support web site: <a href="http://welcome.hp.com/country/us/eng/software_drivers.html">http://welcome.hp.com/country/us/eng/software_drivers.html</a>

## Technical Specifications - Monitors

HP L1965 19-inch LCD Monitor	Panel	Type	Active matrix, thin film transistor (TFT)
		Viewable Image Area (diagonal)	19 inches; 48.25 cm maximum viewable
		Screen Opening (WxH)	14.9 x 12.0 inches; 38.0 x 30.5 cm
		Viewing Angle (typical)	178 degrees horizontal/178 degrees vertical (10:1 minimum contrast ratio)
		Brightness (typical)	300 nits (cd/m <sup>2</sup> )
		Contrast Ratio (typical)	1000:1 (typical)
		Response Rate (typical)	6 ms (typical gray to gray)**
		Pixel Pitch	0.294 mm
		Backlight Lamp Life (to half brightness)	50K hours
		<p><b>*NOTE:</b> All performance specifications represent the typical specifications provided by HP's component manufacturers; actual performance may vary either higher or lower.</p> <p><b>**NOTE:</b> 20 ms rise and fall</p>	
Video/Other Inputs		Plug and Play	Yes (supports VESA DDC2B and DDC/CI; PC2001 compliant)
		Self Powered USB 2.0 Hub	One upstream, four downstream ports (cable included)
		Input Signal	Two DVI-I connectors (VGA analog or digital)
		Input Impedance	75 ohms $\pm$ 2%
		Sync Input	Separate sync (HSYNC/VSYNC); composite sync, Sync on Green (activated through on-screen display)
		Video Cable	One DVI-D to DVI-D, and 1 DVI-I to VGA cables
		Video Cable Length	71 in (1.8 m)
		Horizontal Frequency	24 to 83 kHz
		Vertical Frequency	48 to 76 Hz
		Native Resolution	1280 x 1024 @ 75 Hz analog 1280 x 1024 @ 60 Hz digital
Signal Interface/ Performance		Maximum Resolution (Analog)	1280 x 1024 @ 75 Hz analog
		Maximum Resolution (Digital)	1280 x 1024 @ 75 Hz digital
		Preset VESA Graphic Modes (non-interlaced)	640 x 480 @ 60 Hz, 72 Hz, 75 Hz 720 x 400 @ 70 Hz 800 x 600 @ 60 Hz, 72 Hz, 75 Hz 1024 x 768 @ 60 Hz, 70 Hz, 75 Hz 1280 x 1024 @ 60 Hz, 75 Hz
		Preset MAC Mode	832 x 624 @ 75 Hz 1152 x 870 @ 75 Hz
		Preset VGA Mode	640 x 480 @ 60 Hz, 72 Hz
		Preset SUN Mode	1152 x 900 @ 76 Hz

## Technical Specifications - Monitors

On Screen Display (OSD) Controls	Fail Safe Mode	Yes (limits out of range signal messages)	
	Maximum Pixel Clock Speed	140 MHz	
	User Programmable Modes	Yes, 15	
	Anti-Glare	Yes	
	Anti-Static	Yes	
	AssetControl	Yes (accessible on HP Compaq Business Desktops featuring Intelligent Manageability)	
	Default Color Temperature	Yes (6500k, 9300k, SRGB, Custom User)	
	Buttons or Switches	Power on/off; 3-button OSD; second level OSD buttons include dual-input switch, dedicated auto adjust switch	
	Languages	English, Spanish, French, German, Netherlands, Italian, Japanese, Simplified Chinese	
	User Controls	Size and Positioning Contrast Brightness Clock, Clock Phase Selectable Color Temperature Serial Number Mode Displayed Sleep Timer Input Selection Factory Reset	
Power	Power Supply	Auto-ranging, 90 to 265 VAC; internal power supply	
	Input Power	100 ~ 240 VAC	
	Nominal Current	1.5 A maximum	
	Frequency	50 ~ 60 Hz	
	Typical Power Consumption	< 35 watts	
	Maximum	< 55 watts	
	Power Saving	< 2 watts	
	Off Mode	0 watts (when master power switch is in the off position)	
Mechanical	Power Cable Length	74.8 in (1.9 m); non-captive	
	Dimensions (H x W x D)	Unpacked with stand	14.85 min to 18.79 max x 15.9 x 8.78 inches (37.72 min to 47.72 max x 40.39 x 22.29 cm)
		Base Area (Footprint D x W)	8.78 x 11.88 inches (22.29 x 30.18 cm)
		Panel only (without stand) (H x W x D)	12.96 x 15.9 x 2.4 inches (32.91 x 40.39 x 6.1 cm)
	Weight	Unpacked with stand	15.6 lbs (7.06 kg)
		Unpacked without stand	9.26 lbs (4.19 kg)
		Packaged	20.5 lbs (9.27 kg)

Technical Specifications - Monitors

Environmental	Bezel Width	12.5 mm left and right, 12.75 mm top and bottom
	Tilt Range	-4 degrees to +30 degrees
	Swivel Range	± 45 degrees horizontal swivel
	Height Adjustable	Yes (4 in/100mm adjustment range)
	Pivot Rotation	Yes, 90 degrees
	Base	Ships attached and is removable
	Temperature – Operating	41° to 95° F (5° to 35° C)
	Temperature – Non-operating	-4° to 140° F (-20° to 60° C)
	Humidity – Operating	20% to 80%
	Humidity – Non-operating	5% to 95%
Environmental Data	Altitude – Operating	0 to 12,000 ft (0 to 3,658 m)
	Altitude – Non-operating	0 to 40,000 feet; 0 to 12,192 m
	Eco-Label Certifications and Declarations	<p>This product has received or is in the process of being certified to the following approvals and may be labeled with one or more of these marks:</p> <ul style="list-style-type: none"><li>• US Energy Star</li><li>• CEC</li></ul>

Energy Consumption (in accordance with US Energy Star test method)	AC Input Voltage at 100 VAC +/- 5 VAC, 50 Hz +/- 3 Hz	AC Input Voltage at 115 VAC +/- 5 VAC, 60 Hz +/- 3 Hz	AC Input Voltage at 230 VAC +/- 5 VAC, 50 Hz +/- 3 Hz
Normal Operation	35.7 watts	35.6 watts	35.1 watts
Sleep	1.08 watts	1.14watts	1.23 watts
Off	0.93 watts	0.94 watts	0.92 watts
Heat Dissipation*	100 VAC, 50 Hz	115 VAC, 60 Hz	230 VAC, 50 Hz
Normal Operation	121.7 BTU/hr	121.4 BTU/hr	119.7 BTU/hr
Sleep	3.68 BTU/hr	3.89 BTU/hr	4.19 BTU/hr
Off	3.17 BTU/hr	3.21 BTU/hr	3.14 BTU/hr
*NOTE: Heat dissipation is calculated based on the measured watts, assuming the service level is attained for one hour.			

Longevity and Upgrading	Upgradeability features contained in the product include: One upstream and four downstream USB ports
Ergonomics	The monitor meets the ergonomic requirement of EN-ISO 13406-2 for flat panel displays.
Additional Information	<p>This product is in compliance with the Restrictions of Hazardous Substances (RoHS) Directive, 2002/95/EC.</p> <p>This HP product is designed to comply with the Waste Electrical and Electronic Equipment (WEEE) Directive, 2002/96/EC.</p>

### Technical Specifications - Monitors

#### Material Usage

Plastics parts weighing over 25 grams used in the product are marked per ISO 11469 and ISO1043.

Display meets the requirement for low frequency electromagnetic fields per MPR-II, TCO, and prEN50279 A/B/C.

This product contains 100% recycled materials (by wt.)

This product is 100% recycleable when properly disposed of at end of life.

#### Packaging Materials

- Corrugated - 0.955 kg
- Plastic (other) - 0.055 kg
- Polystyrene - 0.24 kg

This product does not contain any of the following substances in excess of regulatory limits (refer to the HP General Specification for the Environment at

[http://www.hp.com/hpinfo/globalcitizenship/environment/supplychain/gen\\_specifications.html](http://www.hp.com/hpinfo/globalcitizenship/environment/supplychain/gen_specifications.html)):

- Asbestos
- Certain Azo Colorants
- Certain Brominated Flame Retardants - may not be used as flame retardants in plastics
- Cadmium
- Chlorinated Hydrocarbons
- Chlorinated Paraffins
- Formaldehyde
- Halogenated Diphenyl Methanes
- Lead carbonates and sulfates
- Lead and Lead compounds
- Mercuric Oxide Batteries
- Nickel - finishes must not be used on the external surface designed to be frequently handled or carried by the user.
- Ozone Depleting Substances
- Polybrominated Biphenyls (PBBs)
- Polybrominated Biphenyl Ethers (PBBEs)
- Polybrominated Biphenyl Oxides (PBBOs)
- Polychlorinated Biphenyl (PCB)
- Polychlorinated Terphenyls (PCT)
- Polyvinyl Chloride (PVC) - except for wires and cables, and certain retail packaging has been voluntarily removed from most applications.
- Radioactive Substances
- Tributyl Tin (TBT), Triphenyl Tin (TPT), Tributyl Tin Oxide (TBTO)

#### Packaging

HP follows these guidelines to decrease the environmental



impact of product packaging:

- Eliminate the use of heavy metals such as lead, chromium, mercury and cadmium in packaging materials.
- Eliminate the use of ozone-depleting substances (ODS) in packaging materials.
- Design packaging materials for ease of disassembly.
- Maximize the use of post-consumer recycled content materials in packaging materials.
- Use readily recyclable packaging materials such as paper and corrugated materials.
- Reduce size and weight of packages to improve transportation fuel efficiency.
- Plastic packaging materials are marked according to ISO 11469 and DIN 6120 standards.

End-of-life  
Management and  
Recycling

Hewlett-Packard offers end-of-life HP product return and recycling programs in many geographic areas. To recycle your product, please go to: <http://www.hp.com/recycle> or contact your nearest HP sales office. Products returned to HP will be recycled, recovered or disposed of in a responsible manner.

Hewlett-Packard  
Corporate  
Environmental  
Information

For more information about HP's commitment to the environment:

Global Citizenship Report

<http://www.hp.com/hpinfo/globalcitizenship/gcreport/index.html>

Eco-label certifications

<http://www.hp.com/hpinfo/globalcitizenship/environment/productdesign/ecolabels.html>

ISO 14001 certificates:

<http://www.hp.com/hpinfo/globalcitizenship/environment/operations/envmanagement.html>

Options

HP Silver Flat Panel  
Speaker Bar

Powered directly by the monitor or PC, seamlessly attaches to the monitor's bezel to bring full multimedia support to select HP flat panel monitors. Features include dual speakers with full sound range and external jack for headphones. Sold separately, part number EE418AA. For more information, refer to the HP Flat Panel Speaker Bar QuickSpecs.

Other

Accessories Included

One DVI-D to DVI-D cable, one DVI-I to VGA cable, one USB cable, and CD-ROM with Pivot Pro software, HP Display Assistant software, and HP Display LiteSaver software.

Software

Pivot Pro software from Portrait Displays, Inc. interacts with your PC's native graphics driver to enable seamless portrait screen redraws with a simple mouse-click or keyboard command. Pivot Pro supports 90-degree portrait and landscape views. Language support is available in English, Japanese, French, German, Spanish,



Technical Specifications - Monitors

	Italian, and Traditional and Simplified Chinese. HP Display Assistant is a software utility that allows monitor adjustment, color calibration, and security/asset management using the Display Data Channel Command Interface (DDC/CI) protocol of the connected desktop PC. HP Display LiteSaver feature allows you to schedule Sleep mode at preset times to help protect the monitor against image retention, drastically lower power consumption and energy costs, and extend the lifespan of the monitor.
User Guide Languages	English, Bahasa, B. Portuguese, French, LA Spanish, Korean, Simplified Chinese, Traditional Chinese, Japanese, Danish, Dutch, Finnish, German, Italian, Norwegian, Swedish, Greek, Polish, Russian, Slovenian, Turkish
Warranty Languages	English
Color	Carbonite, two-tone carbonite and silver (EMEA only)
VESA Mounting	Yes (swing arm/wall mount not included); base must be removed for mounting options)
VESA External Mounting	Yes (standard 4 hole pattern, 100 mm)
Kensington Lock-ready	Yes
Certification and Compliance	Australian ACA Approval, Canadian Requirements/CSA, CE Marking, China CCIB/CCEE Approval, CISPR Requirements, Eastern European Approvals, Energy Star Compliant, FCC Approval, German Ergonomic (TUV and GS Mark), ISO 13406-2 Compliant (Pixel Defect Guidelines), Mexican NOM Approval, MPR-II Compliant, PC2001 Compliant, PC99 Certified, S. Korean MIC Approval, Taiwan BSMI Approval, TCO 99 or 03 depending on region (emissions, ergonomics, environment), TUV-Ergo, UL Listed, VCCI Approvals, Microsoft® Windows® Certification
Compatibility	VESA Video Signal Standard (VSI) Compliant video cards have been tested and proven compatible for use with the HP LP1965 Flat Panel Monitor. Recommended for use with HP products.
Service and Warranty	Three years parts, labor, and on-site service. 24-hour, 90-day, toll-free technical support. Replacement options may include second business day on-site service, or next business day direct replacement, at HP's sole discretion. With direct replacement, HP will ship a replacement display product directly to you. Using the prepaid shipping labels provided, return your failed display to HP in the same packaging as the replacement. Certain restrictions and exclusions apply. For details see your product warranty or contact HP Customer Support.

HP LP2065 20-inch LCD Panel  
Monitor

Type	20-inch Active Matrix TFT (thin film transistor)
Viewable Image Area (diagonal)	20.1 inches; 51 cm
Screen Opening (W x H)	16.2 x 12.17 inches; 41.1 x 30.9 cm
Viewing Angle (typical)*	Up to 178° horizontal/178° vertical (10:1 minimum contrast ratio)



## Technical Specifications - Monitors

On Screen Display (OSD) Controls	Brightness (typical)*	Up to 300 nits (cd/m2)
	Contrast Ratio (typical)*	Up to 800:1
	Response Rate (typical)*	8 ms (gray to gray), 16 ms (rise + fall)
	Pixel Pitch	0.255 mm
	Backlight Lamp Life (to half brightness)	45K hours
Signal Interface/ Performance	Buttons or Switches	Input select, auto adjust/OSD up, OSD down, OSD menu select, power
	Languages	English, French, German, Spanish, Italian, Dutch, and Japanese
	User Controls	Brightness, contrast, positioning, color temperature, individual color control, serial number display, full screen resolutions, clock, clock phase, input selection, image control (including scaling), and factory reset
	Horizontal Frequency	30 to 94 kHz (VGA input); 30 to 92 KHz (DVI input for modes with pixel clock less than 157 MHz)
	Vertical Frequency	48 to 85 Hz (VGA input); 30 to 92 KHz (DVI input for modes with pixel clock less than 157 MHz)
	Native Resolution	1600 x 1200 @ 60 Hz (recommended)
	Preset VESA Graphic Modes (non-interlaced)	1600 x 1200 @ 60 Hz, 75 Hz (VGA input)
		1280 x 1024 @ 60 Hz, 75 Hz, 85 Hz
		1280 x 960 @ 60 Hz
		1152 x 900 @ 66 Hz
		1024 x 768 @ 60 Hz, 75 Hz, 85 Hz
		800 x 600 @ 60 Hz, 85 Hz
		640 x 480 @ 60 Hz, 75 Hz, 85 Hz
	Text Mode	720 x 400 @ 70 Hz
	Mac Mode	1152 x 870 @ 75 Hz and 832 x 624 @ 75 Hz
	Sun Mode	1152 x 900 @ 66 Hz
Video Input	Maximum Pixel Clock Speed	202 MHz (VGA input); 162 MHz (DVI input)
	User Programmable Modes	Yes, 10
	Anti-Glare	Yes
	Anti-Static	Yes
	Default Color Temperature	6500 K
	Plug and Play	Yes
	Input Signal	Four connectors, including one 15-pin mini D-sub VGA, one DVI-I (VGA analog and digital input), one composite video, and one s-video

## Technical Specifications - Monitors

Power	Self Powered USB 2.0 Hub	One upstream, four downstream ports (cable included)	
	Input Signal	Two DVI-I connectors (dual VGA analog or dual digital input possible)	
	Input Impedance	75 ohms $\pm$ 10%	
	Sync Input	Separate sync (HSYNC/VSYNC); composite sync, Sync on Green	
	Video Cable	Two VGA to DVI-I; two DVI-D to DVI-I	
	Video Cable Length	5.9 ft (1.8 m)	
	Input Power	Auto-Ranging, 90 to 132 VAC and 195 to 265 VAC; internal power supply, 50 Hz/60 Hz	
	Frequency	47.5 to 63 Hz	
	Typical Power Consumption	55 watts (without USB ports); 70 watts (USB ports fully loaded)	
	Maximum	< 75 W	
Mechanical	Power Saving	< 2 watts	
	Power Cable Length	5.9 ft (1.8 m)	
	Dimensions (H x W x D)	Unpacked with stand	16.7 to 21.8 x 17.4 x 8.67 in 42.5 to 55.5 x 44.3 x 22.0 cm
		Unpacked w/o stand (head only)	13.58 x 17.4 x 3.42 in 34.5 x 44.3 x 8.7 cm
		Packaged	11.77 x 22.2 x 16.77 in 29.9 x 56.4 x 42.6 cm
	Weight	Unpacked	With stand: 20.28 lb (9.2 kg); Without stand: 12.35 lb (5.6 kg)
		Packaged	26.3 lb (11.95 kg)
	Tilt Range	-5° to + 25° vertical tilt	
	Swivel Range	-45° to + 45°	
	Height Adjustable	Yes, range 5.1 inches; 13.0 cm	
Environmental	Pivot Rotation	Yes	
	Base	Detachable, ships attached	
	Temperature – Operating	46° to 95° F (10° to 35° C)	
	Temperature – Non-operating	6° to 140° F (-10° to 60° C)	
	Humidity – Operating	20% to 80% non-condensing	
	Humidity – Non-operating	5% to 85%	
	Altitude – Operating	+12,000 ft (+3,657.6 m)	
	Altitude – Non-operating	+40,000 ft (+12,192 m)	
	Options	HP Silver Flat Panel	
		Powered directly by the monitor or the PC, the	

## Technical Specifications - Monitors

Other	<b>Speaker Bar - Part number: EE418AA</b>	Speaker Bar seamlessly attaches to the monitor's lower bezel to bring full audio support to select HP flat panel monitors. Features include dual speakers with full sound range and external jack for headphones. Sold separately. For more information, refer to the HP Silver Flat Panel Speaker Bar QuickSpec.
	<b>Accessories Included</b>	VGA to DVI-I cable – connects the graphic card's VGA connector to the monitor's input #1 or 2 (DVI-I analog) connector.  DVI-D to DVI-I cable – connects the graphic card's DVI-D digital connector to the monitor's input #1 or #2 (DVI-I digital) connector.
	<b>User Guide Languages</b>	English, B. Portuguese, French, LA Spanish, Korean, S. Chinese, T. Chinese, Bahasa, Japanese, Danish, Finnish, German, Norwegian, Spanish, Swedish, Greek, Polish, Russian, Slovenian, Turkish
	<b>Software</b>	HP Display Assistant Utility makes it possible to adjust displays settings through the PC using two-way communication via DDCI.  HP Display Lite Saver allows ability to power up and down display at predetermined hours of the day to save power and backlight life.  Pivot Pro software from Portrait Displays, Inc. interacts with your PC's native graphics driver to enable seamless portrait screen redraws with a simple mouse-click or keyboard command. Pivot Pro supports 90-degree portrait and landscape views. Language support is available in English, Japanese, French, German, Spanish, Italian, and Traditional and Simplified Chinese.
	<b>User Guide Languages</b>	English
Certification and Compliance	<b>Warranty Languages</b>	English
	<b>Color</b>	Carbonite/Silver
	<b>VESA External Mounting</b>	Yes (Standard 4 hole pattern, 100 mm)
	<b>Kensington Lock-Ready</b>	Yes
		Canadian Requirements/CSA, CE Marking, CISPR Requirements, , Energy Star Compliant, FCC Approval, ISO 13406-2 Pixel Defect Guidelines, Mexican NOM Approval,, MPR-II Compliant, PC2001 Compliant, PC99 Certified, TCO 03 (emissions, ergonomics, environment), TUV-Ergo, UL Listed, VCCI Approvals, Microsoft Windows Certification (Microsoft Windows 98, Microsoft Windows 2000, and Microsoft Windows XP)
Compatibility		Compatible with platforms using the VESA standard video modes. Recommended for use with HP products.

### Technical Specifications - Monitors

#### Service and Warranty

Three years parts, labor, and on-site service. 24-hour 365-day 1-800 technical support. Replacement options include 2nd business day on-site service or next business day direct replacement. With direct replacement, HP will ship a replacement display product directly to you. Using the shipping labels provided, return your failed display to HP. Certain restrictions and exclusions apply. For details, contact HP Customer Support.

#### HP LP2465 24-inch Widescreen LCD Monitor

#### Panel

Type	24-inch Active Matrix TFT (thin film transistor)
Viewable Image Area (diagonal)	24 inches; 60.96 cm
Screen Opening (W x H)	20.47 x 12.83 inches; 52.0 x 32.6 cm
Viewing Angle (typical)*	178° H/ 178° V (10:1 minimum contrast ratio)
Brightness (typical)*	500 nits (cd/m <sup>2</sup> )
Contrast Ratio (typical)*	1000:1
Response Rate (typical)*	8 ms (typical gray to gray)
Pixel Pitch	0.270 mm
Backlight Lamp Life (to half brightness)	50K hours

\*Response time 13 ms rise and fall, 6 ms gray to gray.

#### On Screen Display (OSD) Controls

Buttons or Switches	Input Select, Auto Adjust, OSD Up, OSD Down, OSD Menu Select, Power
Languages	English, French, German, Spanish, Italian, Japanese, Dutch
User Controls	Brightness, contrast, positioning, color temperature, individual color control, serial number display, full screen resolutions, clock, clock phase, input selection (includes separate direct access key for dedicated swap between inputs 1 and 2), factory reset

#### Signal Interface/Performance

Horizontal Frequency	30 to 94 kHz (VGA input); 30 to 92 KHz (DVI input) (for modes with pixel clock less than 157 MHz)
Vertical Frequency	48 to 85 Hz (VGA and DVI input)
Native Resolution	1920 x 1200 @ 60 Hz (recommended) (native aspect ratio of 16:10)
Preset VESA Graphic Modes (non-interlaced)	1920 x 1200 @ 60 Hz 1600 x 1200 @ 60 Hz, 75 Hz 1280 x 1024 @ 60 Hz, 75 Hz, 85 Hz 1280 x 960 @ 60 Hz 1152 x 900 @ 66 Hz 1024 x 768 @ 60 Hz, 75 Hz, 85 Hz 800 x 600 @ 60 Hz, 75 Hz 640 x 480 @ 60 Hz, 75 Hz
Text Mode	720 x 400 @ 70 Hz
Mac Mode	1152 x 870 @ 75 Hz and 832 x 624 @ 75 Hz

## Technical Specifications - Monitors

Video/Other Inputs	Sun Mode	1152 x 900 @ 66 Hz
	Maximum Pixel Clock Speed	202 MHz (VGA input); 162 MHz (DVI input)
	User Programmable Modes	Yes, 20
	Anti-Glare	Yes
	Anti-Static	Yes
	Default Color Temperature	6500 K
	Plug and Play	Yes
	Self Powered USB 2.0 Hub	One upstream, four downstream ports (located on side of monitor, cable included)
	Input Signal	Two DVI-I (VGA analog and digital) inputs
	Input Impedance	75 ohms $\pm$ 10%
Power	Sync Input	Separate sync (HSYNC/VSYNC); composite sync, Sync on Green
	Video Cable	VGA to DVI-I; DVI-D to DVI-D
	Video Cable Length	5.9 ft (1.8 m)
	Input Power	Auto-Ranging, 90 to 132 VAC and 195 to 265 VAC; internal power supply, 50 Hz/60 Hz
	Frequency	47.5 to 63 Hz
	Typical Power Consumption	75 watts
	Maximum	< 110 watts
	Power Saving	< 2 watts
	Power Cable Length	6.2 ft (1.9 m)
	Dimensions (H x W x D)	<b>Unpacked w/ stand</b> 14.6 (min) to 19.7 (max) x 22 x 9.1 in (37.1 (min) to 50.1 (max) x 55.4 x 23.2 cm <b>Unpacked w/o stand (head only)</b> 14.4 x 22 x 3.7 in 36.6 x 55.84 x 9.2 cm <b>Packaged</b> 11.7 x 22.1 x 25.6 in 29.8 x 56.0 x 65.1 cm
Mechanical	Weight	<b>Unpacked</b> 23.6 lbs (10.7 kg) <b>Packaged</b> 23.6 lbs (10.7 kg)
	Tilt Range	-5° to + 25° vertical
	Swivel Range	-45° to + 45°
	Height Adjustable	Yes, range 5.1 inches; 130 mm
	Pivot Rotation	Yes
	Base	Detachable, ships detached
	Temperature – Operating	46° to 95° F (10° to 35° C)
Environmental		

## Technical Specifications - Monitors

Other	Temperature – Non-operating	6° to 140° F (-10° to 60° C)
	Humidity – Operating	20% to 80% non-condensing
	Humidity – Non-operating	5% to 85%
	Altitude – Operating	+12,000 ft (+3,657.6 m)
	Altitude – Non-operating	+40,000 ft (+12,192 m)
	Accessories Included	VGA to DVI-I cable – connects the graphic card's VGA connector to the monitor's input #2 (DVI-I analog) connector DVI-D to DVI-D cable – connects the graphic card's DVI-D digital connector to the monitor's input #2 (DVI-I digital) connector
	Software	Pivot Pro software from Portrait Displays, Inc. interacts with your PC's native graphics driver to enable seamless portrait screen redraws with a simple mouse-click or keyboard command. Pivot Pro supports 90-degree portrait and landscape views. Language support is available in English, Japanese, French, German, Spanish, Italian, and Traditional and Simplified Chinese. HP Display Assistant is a software utility that allows monitor adjustment, color calibration, and security/asset management using the Display Data Channel Command Interface (DDC/CI) protocol of the connected desktop PC. HP Display LiteSaver feature allows you to schedule Sleep mode at preset times to help protect the monitor against image retention, drastically lower power consumption and energy costs, and extend the lifespan of the monitor.
	User Guide Languages	English, B. Portuguese, French, LA Spanish, Korean, S. Chinese, T. Chinese, Bahasa, Japanese, Danish, Finnish, German, Norwegian, Spanish, Swedish, Greek, Polish, Russian, Slovenian, Turkish
	Warranty Languages	English, Canadian French, LA Spanish, Brazilian Portuguese, Danish, German, Castilian Spanish, French, Italian, Dutch, Norwegian, Finnish, Swedish, Bahasa Indonesian, Korean, T. Chinese, S. Chinese
	Color	Carbonite/silver
Options	VESA External Mounting	Yes (Standard 4 hole pattern, 100 mm)
	Kensington Lock-Ready	Yes
	HP Silver Flat Panel Speaker Bar - Part number: EE418AA	Powered directly by the monitor or PC, the Speaker Bar seamlessly attaches to the monitor's lower bezel to bring full audio support to select



Technical Specifications - Monitors

HP flat panel monitors. Features include dual speakers with full sound range and an external jack for headphones. Sold separately. For more information, refer to the HP Flat Panel Speaker Bar QuickSpec.

**Certification and Compliance** Australian ACA Approval, Canadian Requirements/CSA, CE Marking, China CCIB/CCEE Approval, CISPR Requirements, Eastern European Approvals, Energy Star Compliant, FCC Approval, German Ergonomic (TUV and GS Mark), ISO 9241-3,7,8 VDT Guidelines, ISO 13406-2 Pixel Defect Guidelines, Mexican NOM Approval, MIC Requirements (New Zealand), MPR-II Compliant, Nordic Approvals (Nemko, Fimko, Demko, Semko), PC2001 Compliant, PC99 Certified, S. Korean MIC Approval, Taiwan BSMI Approval, TCO 03 (emissions, ergonomics, environment), TUV-Ergo, UL Listed, VCCI Approvals, Microsoft Windows Certification (Microsoft Windows 98, Microsoft Windows 2000, and Microsoft Windows XP)

**Compatibility** Compatible with platforms using the VESA standard video modes. Recommended for use with HP products.

**Service and Warranty** Three years parts, labor, and on-site service. 24-hour, 90-day, toll-free technical support. Replacement options may include second business day on-site service, or next business day direct replacement, at HP's sole discretion. With direct replacement, HP will ship a replacement display product directly to you. Using the prepaid shipping labels provided, return your failed display to HP in the same packaging as the replacement. Certain restrictions and exclusions apply. For details see your product warranty or contact HP Customer Support.

HP LP3065 30-inch Widescreen LCD Monitor	Panel	Type	30.0-inch Wide Format Active Matrix TFT (thin film transistor)
		Viewable Image Area (diagonal)	29.77 in (75.623 cm)
		Screen Opening (W x H)	25.3 x 15.8 in (64.3 x 40.3 cm)
		Viewing Angle (typical)*	Up to 178° H/ 178° V (10:1 minimum contrast ratio)
		Brightness (typical)*	300 nits (cd/m2)
		Contrast Ratio (typical)*	1000:1
		Response Rate (typical)*	12 ms (8 ms average gray to gray)
		Pixel Pitch	0.250 mm
		Backlight Lamp Life (to half brightness)	40K hours
		Color Gamut	92% of NTSC
	On Screen Display (OSD) Controls	Buttons or Switches	Input select, brightness up, brightness down, power
		User Controls	Brightness, input selection
	Signal Interface/ Performance	Horizontal Frequency	100 KHz
		Vertical Frequency	60 Hz

## Technical Specifications - Monitors

	Native Resolution	2560 x 1600 @ 60 Hz (native aspect ratio of 16:10)
	Pixel Clock Speed	275 MHz
	Anti-Glare	Yes
	Anti-Static	Yes
	Default Color Temperature	6500 K
Video/Other Inputs	Plug and Play	Yes
	Self Powered USB 2.0 Hub	One upstream, four downstream ports (located on side of monitor, cable included)
	Input Signal	Three dual-link DVI-D inputs (Windows PC and graphics card that supports DVI ports with dual-link digital bandwidth and VESA DDC standard for plug-and-play setup requires a DVI-D dual-link graphic card that supports WQXGA (2560 x 1600) resolution.)
Power	Video Cable	Two dual-link DVI cables
	Video Cable Length	5.9 ft (1.8 m)
	Input Power	Auto-Ranging, 100 to 240 VAC; internal power supply, 50 Hz/60 Hz
	Typical Power Consumption	118 watts
	Maximum	< 176 watts
Mechanical	Power Saving	< 2 watts
	Power Cable Length	5.9 ft (1.8 m)
	Dimensions (H x W x D)	<b>Unpacked w/ stand</b> 19.3 to 23.2 x 27.2 x 9.5 in (49.0 to 59.0 x 69.2 x 24.0 cm)
		<b>Unpacked w/o stand (head only)</b> 17.9 x 27.2 x 3.3 in (45.5 x 69.2 x 8.4 cm)
		<b>Packaged</b> 22.4 x 31.1 x 14.9 in (56.8 x 79.0 x 37.8 cm)
Environmental	Weight	<b>Unpacked</b> 30.6 lbs (13.9 kg)
	Tilt Range	-5° to + 30° vertical
	Swivel Range	-45° to + 45°
	Height Adjustable	Yes, range 5.1 in (100 mm)
	Pivot Rotation	No
	Base	Detachable, ships detached
	Temperature – Operating	46° to 95° F (10° to 35° C)
	Temperature – Non-operating	6° to 140° F (-10° to 60° C)
	Humidity – Operating	20% to 80% non-condensing
	Humidity – Non-operating	5% to 85%

Technical Specifications - Monitors

Environmental Data	Altitude – Operating	+12,000 ft
	Altitude – Non-operating	+40,000 ft
	Eco-Label	This product has received or is in the process of being certified to the following approvals and may be labeled with one or more of these marks:
	Certifications and Declarations	
		<ul style="list-style-type: none"><li>● US Energy Star</li><li>● US Federal Energy Management Program (FEMP)</li><li>● IT Eco Declaration</li><li>● TCO 03</li><li>● Taiwan Green Mark</li><li>● CECP</li><li>● Korea Eco-label</li><li>● EPEAT - Silver</li></ul>

Energy Consumption (in accordance with US Energy Star test method)	AC Input Voltage at 100 VAC +/- 5 VAC, 50 Hz +/- 3 Hz	AC Input Voltage at 115 VAC +/- 5 VAC, 60 Hz +/- 3 Hz	AC Input Voltage at 230 VAC +/- 5 VAC, 50 Hz +/- 3 Hz
Normal Operation	102.8 watts	101.7 watts	100.4watts
Sleep <sup>1</sup>	2 watts	2 watts	2 watts
Off	0.05 watts	0.06 watts	0.25 watts
Heat Dissipation <sup>2</sup>	AC Input Voltage at 100 VAC +/- 5 VAC, 50 Hz +/- 3 Hz	AC Input Voltage at 115 VAC +/- 5 VAC, 60 Hz +/- 3 Hz	AC Input Voltage at 230 VAC +/- 5 VAC, 50 Hz +/- 3 Hz
Normal Operation	350.8 BTU/hr	347.0 BTU/hr	342.6 BTU/hr
Sleep	6.8 BTU/hr	6.8 BTU/hr	6.8 BTU/hr
Off	0.2 BTU/hr	0.2 BTU/hr	0.9 BTU/hr

**NOTES**  
<sup>1</sup>This sleep status ignore the input sync signal check cycle when metering the model in sleep mode.  
<sup>2</sup>Heat dissipation is calculated based on the measured watts, assuming the service level is attained for one hour.

Longevity and Upgrading	Upgradeability features contained in the product include: One upstream and four downstream USB ports
Ergonomics	The monitor meets the ergonomic requirement of EN-ISO 13406-2 for flat panel displays.
Additional Information	<p>This product is in compliance with the Restrictions of Hazardous Substances (RoHS) Directive, 2002/95/EC.</p> <p>This HP product is designed to comply with the Waste Electrical and Electronic Equipment (WEEE) Directive, 2002/96/EC.</p> <p>This product is in compliance with California Proposition 65 (State of California; Safe Drinking Water and Toxic Enforcement Act of 1986).</p>

### Technical Specifications - Monitors

This product is in compliance with the IEEE 1680 (EPEAT) standard at the SILVER level, see [www.epeat.net](http://www.epeat.net).

Plastics parts weighing over 25 grams used in the product are marked per ISO 11469 and ISO1043.

Display meets the requirement for low frequency electromagnetic fields per MPR-II, TCO, and prEN50279 A/B/C.

This product contains 0% recycled materials (by wt.)

This product is 97.6% recycleable when properly disposed of at end of life.

#### Packaging Materials

- Corrugated Paper 2.19 kg
- PE-LD Bags 0.09 kg
- EPS Molded Foam 1.07 kg

#### RoHS Compliance

Hewlett-Packard is committed to compliance with all applicable environmental laws and regulations, including the European Union Restriction of Hazardous Substances (RoHS) Directive. HP's goal is to exceed compliance obligations by meeting the requirements of the RoHS Directive on a worldwide basis. By July 1, 2006, RoHS substances will be virtually eliminated (virtually = to levels below legal limits) for all HP electronic products subject to the RoHS Directive, except where it is widely recognized that there is no technically feasible alternative (as indicated by an exemption under the EU RoHS Directive).

#### Material Usage

This product does not contain any of the following substances in excess of regulatory limits (refer to the HP General Specification for the Environment at

[http://www.hp.com/hpinfo/globalcitizenship/environment/supplychain/gen\\_specifications.html](http://www.hp.com/hpinfo/globalcitizenship/environment/supplychain/gen_specifications.html)):

- Asbestos
- Certain Azo Colorants
- Certain Brominated Flame Retardants - may not be used as flame retardants in plastics
- Cadmium
- Chlorinated Hydrocarbons
- Chlorinated Paraffins
- Formaldehyde
- Halogenated Diphenyl Methanes
- Lead carbonates and sulfates
- Lead and Lead compounds
- Mercuric Oxide Batteries
- Nickel - finishes must not be used on the external surface designed to be frequently handled or carried

		<p>by the user.</p> <ul style="list-style-type: none"> <li>• Ozone Depleting Substances</li> <li>• Polybrominated Biphenyls (PBBs)</li> <li>• Polybrominated Biphenyl Ethers (PBBEs)</li> <li>• Polybrominated Biphenyl Oxides (PBBOs)</li> <li>• Polychlorinated Biphenyl (PCB)</li> <li>• Polychlorinated Terphenyls (PCT)</li> <li>• Polyvinyl Chloride (PVC) - except for wires and cables, and certain retail packaging has been voluntarily removed from most applications.</li> <li>• Radioactive Substances</li> <li>• Tributyl Tin (TBT), Triphenyl Tin (TPT), Tributyl Tin Oxide (TBTO)</li> </ul>
	<b>Packaging</b>	<p>HP follows these guidelines to decrease the environmental impact of product packaging:</p> <ul style="list-style-type: none"> <li>• Eliminate the use of heavy metals such as lead, chromium, mercury and cadmium in packaging materials.</li> <li>• Eliminate the use of ozone-depleting substances (ODS) in packaging materials.</li> <li>• Design packaging materials for ease of disassembly.</li> <li>• Maximize the use of post-consumer recycled content materials in packaging materials.</li> <li>• Use readily recyclable packaging materials such as paper and corrugated materials.</li> <li>• Reduce size and weight of packages to improve transportation fuel efficiency.</li> <li>• Plastic packaging materials are marked according to ISO 11469 and DIN 6120 standards.</li> </ul>
	<b>End-of-life Management and Recycling</b>	<p>Hewlett-Packard offers end-of-life HP product return and recycling programs in many geographic areas. To recycle your product, please go to: <a href="http://www.hp.com/recycle">http://www.hp.com/recycle</a> or contact your nearest HP sales office. Products returned to HP will be recycled, recovered or disposed of in a responsible manner.</p>
	<b>Hewlett-Packard Corporate Environmental Information</b>	<p>For more information about HP's commitment to the environment:            Global Citizenship Report  <a href="http://www.hp.com/hpinfo/globalcitizenship/gcreport/index.html">http://www.hp.com/hpinfo/globalcitizenship/gcreport/index.html</a>            Eco-label certifications  <a href="http://www.hp.com/hpinfo/globalcitizenship/environment/productdesign/ecolabels.html">http://www.hp.com/hpinfo/globalcitizenship/environment/productdesign/ecolabels.html</a>            ISO 14001 certificates:  <a href="http://www.hp.com/hpinfo/globalcitizenship/environment/operations/envmanagement.html">http://www.hp.com/hpinfo/globalcitizenship/environment/operations/envmanagement.html</a></p>
<b>Other</b>	<b>Accessories Included</b>	<p>Two dual link DVI-D to DVI-D cables - connects the graphic card's DVI-D digital connector to the monitor's input (DVI-D digital) connectors; power cord</p>

## Technical Specifications - Monitors

	<b>Software</b>	HP Display LiteSaver feature allows you to schedule Sleep mode at preset times to help protect the monitor against image retention, drastically lower power consumption and energy costs, and extend the lifespan of the monitor.
	<b>User Guide Languages</b>	English, B. Portuguese, French, LA Spanish, Korean, S. Chinese, T. Chinese, Bahasa, Japanese, Danish, Finnish, German, Norwegian, Spanish, Swedish, Greek, Polish, Russian, Slovenian, Turkish
	<b>Warranty Languages</b>	English, Canadian French, LA Spanish, Brazilian Portuguese, Danish, German, Castilian Spanish, French, Italian, Dutch, Norwegian, Finnish, Swedish, Bahasa Indonesian, Korean, T. Chinese, S. Chinese
	<b>Color</b>	Carbonite
	<b>VESA External Mounting</b>	Yes (Standard 4 hole pattern, 100 mm)
	<b>Kensington Lock-Ready</b>	Yes
<b>Options</b>	<b>HP Flat Panel Speaker Bar - Part number: EE418AA</b>	Powered directly by the monitor or PC, the Speaker Bar seamlessly attaches to the monitor's lower bezel to bring full audio support to select HP flat panel monitors. Features include dual speakers with full sound range and an external jack for headphones. Sold separately. For more information, refer to the HP Flat Panel Speaker Bar QuickSpec.
<b>Certification and Compliance</b>		Australian ACA Approval, Canadian Requirements/CSA, CE Marking, China CCIB/CCEE Approval, CISPR Requirements, Eastern European Approvals, Compliant, FCC Approval, German Ergonomic (TUV and GS Mark), ISO 9241-3,7,8 VDT Guidelines, ISO 13406-2 Pixel Defect Guidelines, Mexican NOM Approval, MIC Requirements (New Zealand), MPR-II Compliant, Nordic Approvals (Nemko, Fimko, Demko, Semko), S. Korean MIC Approval, Taiwan BSMI Approval, TCO 99 (emissions, ergonomics, environment), TUV-Ergo, UL Listed, VCCI Approvals.
<b>Compatibility</b>		Compatible with platforms using the VESA standard video modes. Recommended for use with HP products.
<b>Service and Warranty</b>		Three years parts, labor, and on-site service. 24-hour, 90-day, toll-free technical support. Replacement options may include second business day on-site service, or next business day direct replacement, at HP's sole discretion. With direct replacement, HP will ship a replacement display product directly to you. Using the prepaid shipping labels provided, return your failed display to HP in the same packaging as the replacement. Certain restrictions and exclusions apply. For details see your product warranty or contact HP Customer Support.

## *Technical Specifications - Monitors*

© Copyright 2008 Hewlett-Packard Development Company, L.P.

All rights reserved. HP and the HP logo are trademarks of the Hewlett Packard Company in the U.S. and/or other countries.

All rights reserved. Microsoft, Windows, Windows Vista, and Windows XP are registered trademarks or trademarks of Microsoft Corporation in the U.S. and/or other countries. NVIDIA and Quadro are trademarks of NVIDIA Corporation. All other product names mentioned herein may be trademarks of their respective companies.

HP shall not be liable for technical or editorial errors or omissions contained herein. The information is provided as is without warranty of any kind and is subject to change without notice. The warranties for HP products are set forth in the express limited warranty statements accompanying such products. Nothing herein should be construed as constituting an additional warranty.